This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

**Usage guidelines**

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

**About Google Book Search**

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

Med.
QM
39
.S92
1913

# LABORATORY GUIDE
IN
# ANATOMY

---

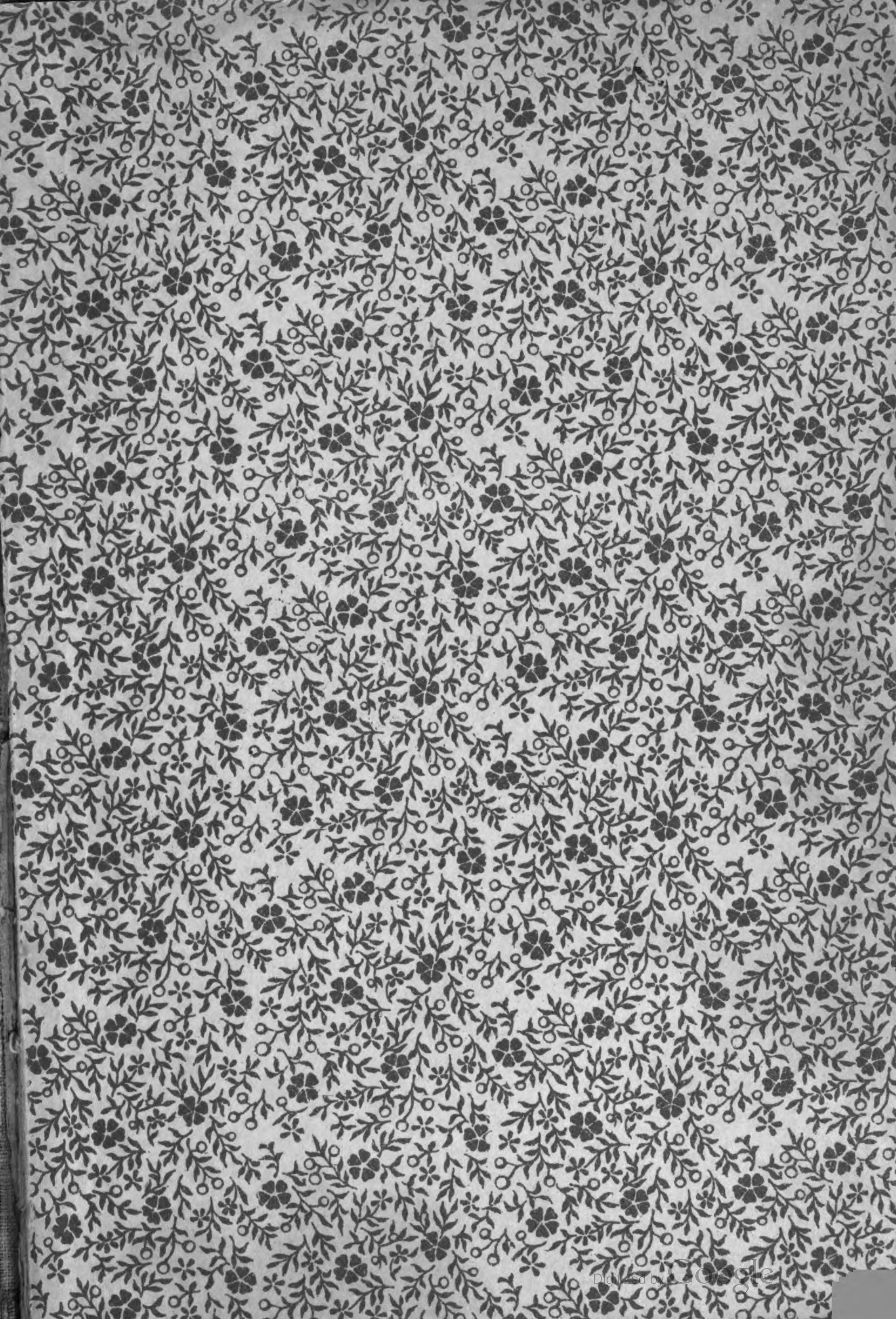
STREETER

GEO. WAHR
PUBLISHER

Google

Navy

THE UNIVERSITY OF MICHIGAN LIBRARIES
1817



Navy

THE UNIVERSITY OF MICHIGAN LIBRARIES
1817

Wed. Dev. of peritoneum.
Bursa.
Stomach rotation.
shifting of other organs.

Monday. To 21 including 1st sentence in
21

[illegible]

Muscle to [illegible]
[illegible]

Maxillary artery
Facial Muscles
[illegible]
[illegible] also,

Reed = 25

Porter = 15 [illegible]

Rosen · OK — 25

Indictment 25 Ret 8 had 20 £3.

Monday 12/11 - 8—13

Lumbo D. Fascia
Long M of Back Ex [illegible] Capitis.
Nerve. Supply
Spinal Canal.
Spinal cord, blood

Navy.

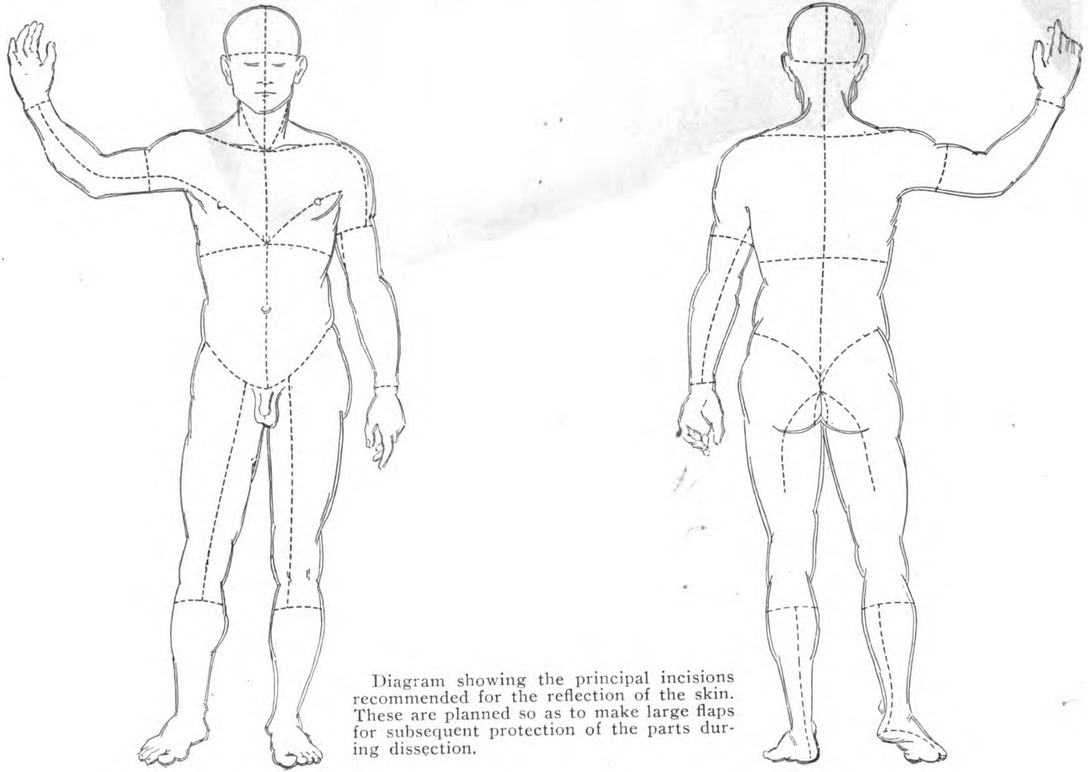


Diagram showing the principal incisions recommended for the reflection of the skin. These are planned so as to make large flaps for subsequent protection of the parts during dissection.

# LABORATORY GUIDE

IN

# ANATOMY

## AN OUTLINE OF DISSECTION DESIGNED FOR STUDENTS OF MEDICINE AT THE UNIVERSITY OF MICHIGAN

inius BY

GEORGE L. STREETER, A. M., M. D.

PROFESSOR OF ANATOMY AND DIRECTOR OF THE ANATOMICAL
LABORATORY IN THE UNIVERSITY OF MICHIGAN

SECOND EDITION

GEORGE WAHR, PUBLISHER
ANN ARBOR, MICH.
1913

Med.
QM
39
.S92
1913

COPYRIGHT, 1913
GEORGE WAHR

THE ANN ARBOR PRESS

THE UNIVERSITY OF MICHIGAN LIBRARIES

P [illegible]
Gift
4-21-23
221 [illegible]
4 1. 53

# PREFACE

The instruction in gross human anatomy in the University of Michigan is so arranged that the required work for the degree of Doctor of Medicine can be completed during the first year of the medical course. Students beginning October first and working half of each day are expected to complete the dissection and the systematic study of the entire body by April fifteenth. After having satisfactorily completed this work the student is examined practically and theoretically over the whole body. A supplementary course of six weeks on regional and topographical anatomy is then offered for the special study of those features in anatomy that have direct application to the practice of medicine and surgery. In the case of students expecting to follow a laboratory career it may be advisable that other work be substituted for the latter course and this can be arranged for on special application.

It is for an anatomical course of this scope that this dissection guide is designed, and in it is outlined the work that can be accomplished by a properly trained student in that amount of available time. For convenience the body is divided bilaterally into three main regions, each requiring an equal amount of time for their completion. This makes three interchangeable dissection-periods of about eight weeks each. Since the beginner dissects slowly, ten weeks may be allowed for the first period, and eight weeks for each of the remaining two. To aid the student in a proper distribution of his time each period is subdivided into sections that indicate approximately how much should be done each day where the given period is eight weeks long. The methods recommended for the reflection of muscles and the exposure of the different regions are based on the supposition that formalin is used as one of the ingredients of the embalming fluid and that the tissues are consequently more or less rigid.

The student is to remember that this outline is artificial, and that at any time where for some good reason he prefers to do so, he may depart from the indicated routine, in so far as he does not interfere with his co-workers. If each student had unlimited time and an abundance of material, he could perhaps with advantage develop his own order of procedure. But where he plans to complete his whole medical course in four years, of which only the mornings of one year are available for gross anatomy, it is essential that he observe strict economy and intelligent distribution in the use of his time. Furthermore, where relatively large classes must work together with a limited amount of material, a coordinated plan then becomes imperative, a plan that will enable an entire class to work in cooperation with the least amount of delay and mutual interference, and one that will tend to the utilization of the available material to the best advantage.

An outline for this purpose should be as brief as is consistent with clearness; it should also be suggestive and should be arranged in a manner that will emphasize as far as possible the morphological and functional significance of each structure as it is dissected. It should not, however, deprive the student of his own mental freedom and should not in any way usurp the place of text-book and atlas. It is these principles that have been kept in mind in the composition of this guide, and the extent to which it conforms to them will be the measure of the reward the writer will feel for the effort that has been given to its preparation.

George L. Streeter.

Ann Arbor, September, 1913.

# DISSECTION OF EXTREMITIES

## — I —

Surface Anatomy. Recognize following bony landmarks:

1. Clavicle and its articulations.
2. Sternum and suprasternal notch.
3. Ribs and costal cartilages.
4. Coracoid process.

Make following incisions: (1) from suprasternal notch to xiphoid process; (2) from upper end of primary incision outwards along clavicle to acromion process and down the arm about five inches; (3) from xiphoid process obliquely upwards and outwards to anterior fold of axilla; (4) from xiphoid process transversely outwards around side of body. The second incision is made in common with the dissector of the neck and the fourth in common with the dissector of abdomen. The skin flaps are now reflected, being careful to encircle the nipple with a knife, leaving the areola intact.

Superficial Fascia. The dissector of the neck will trace down into pectoral region the *platysma myoides* and *descending cutaneous nerves* from the cervical plexus. In addition to these find the *anterior* and *lateral cutaneous branches* of the intercostal nerves and the *perforating branches* of the internal mammary artery.

12-11, 1902-

## — 2 —

Mammary Gland. Study its position attachments and structure. Notice particularly its blood and lymph supply. Note character of *nipple* and its surrounding *areola*. In female subjects dissect out the *lactiferous ducts, ampullae* and *gland lobules.* If gland is not well deveoped simply make median section of gland through nipple. *Supernumerary glands?* Those working on male subjects should visit a table having a female subject.

The superficial and deep fascia is now removed and the pectoralis major muscle cleaned over its whole extent.

**PECTORALIS MAJOR MUSCLE.** Identify its origin from abdominal, sternal and clavicular heads. Notice character and direction of fibres and manner of insertion. Cephalic vein?

— 3 —

**AXILLA** Remove skin from axilla, noticing area of sudoriferous glands on under surface of skin of axillary fossa. Examine axillary fascia. Find lateral cutaneous branches of first, second and third intercostal nerves (intercosto-brachial). Remove fat, fascia and axillary glands and thus display boundaries of axilla. Read particularly about lymphatics of pectoral and axillary region. Contents of axilla? Before going very far with the dissection of the axilla the pectoralis major muscle should be reflected as described in the next section. This displays the contents of the axilla to better advantage.

— 4 —

Pectoralis major may now be divided about one inch from points of origin and turned outward. The nerves and vessels entering its deep surface are to be noted and then dissected free from muscle. What is meant by the costo-coracoid membrane and what structures traverse it?

**PECTORALIS MINOR.** Clean surface of this muscle and study origin, insertion, action and nerve supply. Since the relations of this muscle to the axillary vessels and nerves are important it should not be divided until the latter are more completely exposed.

— 5 —

Continue dissection of axillary space and identify the following: Plate [illegible] 212

1. Brachial plexus and its branches. 950
2. Axillary artery and its branches. 654 — Plate 37-41
3. Axillary vein and its tributaries. 671 — Plate 92

After noticing these relations the pectoralis minor may be divided through middle and dissection of axilla continued.

see plate page 152

359

Trace nerves to and clean surfaces of (1) serratus anterior (serratus magnus); (2) latissimus dorsi; (3) teres major; (4) subscapularis. Review the three divisions and relations of the axillary artery.

## — 6 —

In order to further expose the brachial plexus the clavicle and subclavius muscle must be raised. Disarticulate the *sterno-clavicular joint,* noticing its character, accessory ligaments and interarticular fibrocartilage. The clavicle is then raised outward, and at the same time the subclavius muscle is separated from its under surface, care being taken to preserve its nerve supply.

Study the *subclavius muscle,* its attachments and nerve supply; after which it may be divided. The brachial plexus and axillary space may now be completed. The dissection is facilitated by having the shoulders well blocked up so that the scapula falls away from the side of the thorax.

## — 7 —

The dissection is further simplified by the removal of all the small veins. It is now possible to complete the cleaning of the serratus anterior, teres major and subscapular muscles.

Make a diagrammatic drawing, showing formation and branches of the brachial plexus.

After completion of the brachial plexus and axillary space the body is to be turned over so that the remaining muscles attaching the arm to the trunk may be dissected.

## — 8 —

Make following incisions: (1) from vertebra prominens downwards in median line to spine of last thoracic vertebra; (2) from latter point lateralwards around side of body. Reflect skin flap thus outlined, and in cooperation with dissector of neck study muscles attaching shoulder girdle to trunk. Study attachments of *latissimus dorsi* as dissected by dissector of abdomen.

TRAPEZIUS MUSCLE. Origin, insertion and structure. Notice its three divisions. What is meant by the *auscultation triangle?*

## — 9 —

After whole surface is cleaned, the trapezius is divided at its origin along the median line and reflected outward. Identify the subtrapezial plexus of nerves and blood vessels supplying it on its under surface. Trace the *spinal accessory nerve* to lower end of muscle. Identify *subtrapezial gland.*

MAJOR AND MINOR RHOMBOID MUSCLES. Origin, insertion and nerve supply. Divide at their origin from vertebral spines.

LEVATOR SCAPULAE MUSCLE (levator anguli scapulae). Origin, insertion, nerve supply and action. Divide midway between origin and insertion.

Make a list of all muscles attaching shoulder girdle to trunk and their nerve supply.

SUPERIOR POSTERIOR SERRATUS MUSCLE. Origin and insertion. Compare with *inferior posterior serratus* muscle.

Retract arm as far as possible from body and clean and study *serratus anterior muscle* (serratus magnus).

## — 10 —

At this point the dissector of the arm should coöperate with the dissector of the abdomen in the study and removal of the long muscles of the back, after which the vertebral canal is opened by means of chisels and bone cutters, from third cervical to first thoracic, and a study is made of the spinal cord, the nerve roots, together with the membranes inclosing them. Notice venous plexus surrounding the dural sheath.

## — 11 —

SPINAL CORD. Examine dural sheath inclosing spinal cord and extending outwards to enclose nerve roots and ganglia in the intervertebral foramina. In coöperation with dissector of neck remove articular processes with bone cutters so that all the cervical ganglia and *vertebral artery* are well exposed. Remove the *posterior* and *middle scalenus muscles* and expose the connection of the nerve roots with the brachial and cervical plexuses. In order to expose the first thoracic ganglion and its connection with the brachial plexus a portion of the first rib may be removed.

### — 12 —

With scissors split open the *dura mater* and note *arachoid layer* and blood vessels. *Ligamentum denticulatum?* Remove arachnoid and expose the *ventral* and *dorsal nerve roots*. Note blood supply of cord. In common with other dissectors study the form, position and enlargements of the cord. Significance of *cervical enlargement?* Dorsal columns of cord and their relation to dorsal roots (sensory)? Remove the dural sheath of the ganglia and trace the central and peripheral connections of the dorsal roots, and their relation to the ganglia. Do ventral roots pass through ganglia? *Posterior rami* of nerves (posterior primary divisions)?

1967

### — 13 —

On completing study of cord the arm may be removed as follows: Split cord in the median line from fifth cervical to first thoracic segments and remove the halves thus produced together with the brachial plexus on each side with which they are still connected. In doing this it is necessary to divide the rami communicantes, thus leaving the cervical sympathetic ganglia undisturbed. Divide axillary artery and vein. Divide serratus anterior at its origin reviewing at the same time its origin, insertion and nerve supply. The arm is then free, and the axillary nerves and vessels should be carefully covered in with the muscles and the whole arm wrapped up so as to prevent it from drying, and placed aside.

The dissector of extremities now begins the detachment of the leg. An incision is made from the lower end of the sacrum lateralwards in a curved line down the middle of the posterior surface of the thigh. The skin flaps thus outlined are raised and the dissection of the gluteal region is begun. On removing the superficial fascia note the *superior* and *inferior clunial* (gluteal) nerves. Notice the deep fascia and its relation to *fascia lata*.

993
1007
457

**Glutaeus Maximus Muscle.** Clean the muscle; determine its origin, insertion and action. The muscle is then divided at its origin and turned outward. In doing this the nerves and blood vessels supplying it on its under surface are identified and dissected free. *Superior* and *inferior gluteal nerves, superior* and *inferior gluteal arteries* and *veins*. Remove all the gluteal veins, leaving the arteries. This makes the dissection cleaner. Notice sacrotuberosal ligament (great sacro-sciatic).

## — 14 —

46' GLUTAEUS MEDIUS MUSCLE. Origin, insertion, nerve supply and action.

PIRIFORMIS MUSCLE. Origin, insertion, nerve supply and action. This muscle and the glutaeus medius may be separated at their origin and turned downwards. In coöperation with the dissector of the abdomen the *sacral plexus* and all its branches should now be examined. *Sciatic nerve. Posterior femoral cutaneous nerve* (small sciatic).

GLUTAEUS MINIMUS MUSCLE. Origin, insertion, nerve supply and action.

QUADRATUS FEMORIS MUSCLE. Origin insertion, nerve supply and action. Divide this muscle midway between origin and insertion.

## — 15 —

46 OBTURATOR INTERUS AND EXTERNUS MUSCLES. Note direction of their fibres and insertion. Determine their action. These muscles cannot be completely exposed at this time, so the dissector must refer to his text book and atlas.

GEMELLUS SUPERIOR AND INFERIOR MUSCLES. Note their relation to obturator internus.

All the muscles attaching the femur to the pelvic girdle in the gluteal region should now be divided, leaving the ends of insertion for further study.

Study origin of *hamstring muscles* from tuberosity of ischium. Divide their tendon of origin from the bone. Further study of this group will be taken up later. Divide sciatic and posterior cutaneous nerves at level of obturator internus.

## — 16 —

The body is now turned on its back and the structures attaching the leg to the pelvis in front are dissected. Make an incision from inner one-third of inguinal ligament down to the knee. Reflect skin and expose superficial nerves and vessels, noticing character of superficial fascia:

1. Anterior and lateral femoral cutaneous nerves. ant. 1003 – Lat. 1000
2. Great saphenous vein.
3. Superficial epigastric artery and vein. 618
4. External pudic artery and vein. 619
5. Inguinal lymph glands and connecting vessels. 746

Study the deep fascia and formation of the *fascia lata*. Determine the attachments of the *tensor fasciae latae* and its relation to the *ilio-tibial band*. 457

SAPHENOUS OPENING. Carefully display its *falciform margin* with the *superior cornu* extending to the inguinal ligament and the *inferior cornu* extending to the pectineal fascia. *Fascia cribrosa?*

— 17 —

Notice size, character and contents of the *femoral canal*. In coöperation with the dissector of the abdomen verify the layers that would constitute the hernial sac in femoral hernia.

The deep fascia may then be removed and the muscles exposed that form the *femoral triangle* (Scarpa's triangle). What are the boundaries and contents of this triangle?

Expose and identify all the muscles of the front of the thigh.

1445 *Prepatellar bursa?*

1285 ADDUCTOR CANAL (Hunter's canal). See atlas P66 Determine its length, boundaries and contents. This canal may be nicely exposed by cutting out a short section of the sartorius muscle in its lower half. Note relation of *saphenous nerve* to the canal.

— 18 —

The muscles of the thigh may be more completely separated. Dissect out the *femoral nerve* and *artery* and trace their branches to destination. The gracilis and sartorius muscles should be exposed down to their insertion on tibia.

ADDUCTOR MUSCLES. Study the relations, origins and insertions of all the muscles of this group. Nerve supply?

— 19 —

Study the course and branches of *obturator nerve*. The adductor longus may be divided so as to better expose this nerve. *Adductor minimus?*

PECTINEUS MUSCLE. After identifying its origin, insertion and nerve supply, this muscle may be removed, leaving short remnant of muscle at its origin and insertion.

The gracilis, and adductors longus, brevis and magnus should be divided so as to leave the stubs of origin on the pubic and ischial rami.

RECTUS FEMORIS MUSCLE. After studying its origin and insertion this muscle may be removed, leaving only short stubs at its origin and insertion.

ILIOPSOAS MUSCLE. Notice its relation to *inguinal ligament* and capsule of hip joint. After studying its insertion it may be cut a short distance from its insertion.

— 20 —

This completes all the muscles attaching the leg to the pelvis and as soon as they are divided together with the nerves and vessels, the leg may be removed. This is done by disarticulating the hip joint.

ARTICULATION OF HIP JOINT. Notice capsule with its strengthening bands: (1) *lig. iliofemorale;* (2) *lig. pubocapsulare;* (3) *lig. ischiocapsulare.* Study *zona orbicularis* and *lig. teres femoris.* The joint is then disarticulated and the leg and arm removed to another table for further dissection.

— 21 —

After completing the dissection of all structures in front of thigh, including the *quadriceps femoris* and the *patella* and its ligament, the leg is turned over and the popliteal space exposed, by completing the reflection of the skin flap in front.

POPLITEAL SPACE. Make a dissection exposing the boundaries of this space, its contents and their respective relations. In making this dissection keep the muscles in their normal position as far as possible. Make a schematic drawing of the popliteal space indicating the different structures passing through it.

### — 22 —

Extensor Muscles of Hip. Complete the dissection of the hamstring muscles and follow their insertion down to tibia and fibula. *Pes anserinus?*

Identify *posterior femoral cutaneous nerve* (short sciatic). Complete the dissection of the *sciatic nerve* and its branches (Ischiadicus). High division of sciatic? Complete dissection of ~~the~~ *perforating branches* of femoral and deep circumflex arteries.

Leg. Reflect skin of leg by an incision down median line of back of leg. Expose cutaneous nerves and veins of leg and foot.

1. Sural nerve (external saphenous). — tib. comm
   Union of (a) median sural cutaneous; — fib. comm
   (b) lateral sural cutaneous.
2. Median crural cutaneous.
   Terminal branch of saphenous nerve.
3. Superficial peroneal (musculocutaneous).
   (a) Medial dorsal cutaneous;
   (b) intermediate dorsal cutaneous.

(Lateral dorsal cutaneous is the terminal branch of sural nerve.)

4. Deep peroneal.
5. Digital branches to toes.
6. Median calcaneal branches of tibial nerve.
7. Plantar nerves.

### — 23 —

Notice particularly the cutaneous nerves of the toes. Pacinian bodies?

Make outline of whole leg, showing the areas supplied by the different cutaneous nerves.

Study deep fascia of leg and foot. Notice its arrangement in the form of annular ligaments about the ankle.

Anterior: (a) cruciate ligament;
(b) transverse ligament. 493

Posterior: (a) laciniate ligament (int. annular lig.);
(b) retinacular ligament (ext. annular lig.).

Preserving these ligaments, the deep fascia is now removed and the muscles in front of the leg and on dorsum of foot are exposed. In cleaning them notice the sheaths of the tendons, exploring them with probe to determine their extent.

## — 24 —

Origin, insertion, action and nerve supply of:

1. Tibialis anterior.
2. Extensor hallucis longus.
3. Extensor digitorum longus.
4. Peronaeus tertius.
5. Extensor digitorum brevis.

Determine the origin, insertion, action and nerve supply of:

1. Peronaeus longus.
2. Peronaeus brevis.

In cleaning these muscles be careful to preserve the relations of the tendons to the lateral malleolus and the retinacular ligament. The insertion of the peronaeus longus cannot be seen until the muscles of the foot are dissected.

Study the whole course and all the branches of the *common peroneal nerve* (external popliteal).

## — 25 —

Clean and examine the following muscles:

1. Gastrocnemius.
2. Soleus.
3. Plantaris.
4. Popliteus.
5. Tibialis posterior.
6. Flexor digitorum longus.
7. Flexor hallucis longus.

In some legs the heads of the gastrocnemius may be divided to better expose the plantaris. In others the soleus may also be separated at its origin, thus fully exposing the deep layers. In some all the muscles should be left intact for the study of relations. Notice particularly the tendinous compartments through which the tendons pass into the foot. Learn relation of all the tendons to the ankle.

Study the course of the *popliteal artery* and its branches. Study *anterior* and *posterior tibial arteries,* their course and branches. After identifying the veins, the smaller ones may be removed, and the larger ones should be split open to demonstrate the valves (tibial, popliteal and femoral).

Review *tibial nerve* (internal popliteal) and its branches.

### — 26 —

Foot. Notice character and attachments of *plantar aponeurosis,* after which it may be removed.

Clean and study *flexor digitorum brevis.* It may then be separated at its origin to expose following deep muscles of foot, as well as tendons of the muscles of the leg:

1. Abductor digiti quinti.
2. Abductor hallucis.
3. Quadratus plantae (accesorius).
4. Tendon of flexor digitorum longus.
5. Lumbricales.
6. Tendon of flexor hallucis longus.

Note particularly the manner of insertion of the tendons of the flexor digitorum longus and brevis.

### — 27 —

Study all the nerves and blood vessels of the foot.

To expose the deep muscles of the foot it is well in some cases to divide the tendon of the flexor digitorum longus between the lumbricales and the quadratus plantae. Study:

1. Flexor hallucis brevis.
2. Adductor hallucis; (a) oblique head; (b) transverse head.
3. Flexor digiti quinti brevis.
4. Opponens digiti quinti (usually fused with 3.).
5. Interossei; (a) dorsal; (b) plantar.
6. Tendon of peronaeus longus.

The tendons of the lumbricales and interossei can be well exposed by dividing the transverse ligaments connecting the heads of the metatarsal bones, and forcibly splitting apart the metatarsal bones.

Action and nerve supply of lumbricales and interossei?

## — 28 —

A day should now be given to the review of the attachments, action and nerve supply of all the muscles of the leg, noting particularly the tendons and bony landmarks about the knee and ankle.

Tabulate all the nerves of the leg, giving muscles and skin area supplied by each. Make a schematic drawing of the femoral artery showing its branches and the formation of the popliteal, anterior and posterior tibial, and peroneal arteries. Dissectors of the right leg should now remove all the nerves of the leg, carefully detaching all the branches from skin and muscle, after which they are pinned out on a board and paper labels attached. For this purpose each student should provide himself with a paper of small pins. The same should be done with the arteries.

Review hip joint. The right legs from which the nerves and arteries have been removed may be used to demonstrate the knee and ankle joints, the remaining specimens being reserved for final review. On the selected specimens the muscles are to be all removed, saving only portions of tendons which come in actual contact with joint. Study the capsule of each joint, knee and ankle, and its accessory ligaments. The joints may then be opened to display their interior.

## — 29 —

KNEE JOINT:

1. Capsular ligament:
2. Fibular collateral ligament (ext. lateral lig.);

3. Tibial collateral ligament (int. lateral lig.);
4. Oblique popliteal ligament (posterior ligament);
5. Arcuate popliteal ligament;
6. Patellar ligament;
7. Anterior cruciate ligament;
8. Posterior cruciate ligament;
9. Lateral meniscus (external semilunar cartilage);
10. Median meniscus (internal semilunar cartilage);
11. Transverse ligament;
12. Patellar synovial fold and alar folds;
13. Synovial membrane.

Study all bursae connected with knee joint.

TIBIO-FIBULAR ARTICULATION:

1. Superior joint:
   (1) Articular capsule;
   (2) Capitular ligament (ant. and post. ligaments).
2. Interosseus membrane.
3. Inferior joint (not a true joint);
   (1) Anterior lig. of lateral malleolus;
   (2) Posterior lig. of lateral malleolus.

ANKLE JOINT:

1. Articular capsule.
2. Lateral strengthening bands (ext. lateral lig.):
   (a) Ant. talo-fibular ligament (ant. fasciculus);
   (b) Post. talo-fibular ligament (post fasciculus);
   (c) Calcaneo-fibular ligament (middle fasciculus).
3. Medial strengthening band or deltoid ligament.
4. Anterior talo-tibial ligament (ant. tibio-tarsal);
5. Posterior talo-tibial ligament (post. tibio-tarsal);

(4 and 5 may be included under deltoid ligament).

6. Synovial membrane.

The long and short plantar ligaments on the bottom of the foot should be noted.

### — 30 —

SHOULDER AND ARM. After completing the leg the dissector returns to the arm, which has been previously removed. During the dissection of the arm the leg should be kept covered and moist so that it will be suitable for review purposes.

Remove skin and superficial fascia and identify cutaneous nerves of arm, hand and fingers. Make a natural size drawing of the nerves of hand, front and back, showing proportion of skin supplied by ulnar (blue), radial (red), and median (green) nerves respectively. These drawings are to be kept in Laboratory for statistical purposes. *Pacinian Corpuscles?* Identify them under the microscope. *The superficial veins* exposed during this dissection are to be removed as soon as they are identified. The arm and hand are to be kept wrapt during completion of shoulder.

### — 31 —

The *brachial plexus* should now be reviewed and its branches traced down into arm.

Identify and finish cleaning the seventeen *muscles attached to scapula.* Determine their origin, insertion, nerve-supply, and action. The muscles inserted into tuberosities of humerus should be exposed by dividing deltoid muscle near its origin. Note branches of *axillary nerve* (circumflex). Review blood supply of muscles in scapular region.

### — 32 —

Note character of deep fascia of arm and the compartments formed by the *median* and *lateral intermuscular septa.* Remove deep fascia, and expose and study following muscles:

1. Biceps.
2. Coracobrachialis.
3. Brachialis.
4. Triceps (including Anconeus).

Note sheath of long head of biceps. *Lacertus fiibrosus?* Note manner in which *radial nerve* divides outer and inner heads of triceps. Note carefully the course of the ulnar nerve.

### — 33 —

Study *brachial artery* and its branches.

Observe the formation of the *anterior cubital fossa* and the structures passing through it. Compare with popliteal space. What corresponds to patella? Note analogy between triceps and quadriceps muscles.

**Forearm.** Remove deep fascia, preserving the *volar* and *dorsal carpal ligaments* and expose and study the following muscles:

### — 34 —

Volar group:

1. Pronator teres;
2. Flexor carpi radialis;
3. Palmaris longus;
4. Flexor carpi ulnaris;
5. Flexor digitorum sublimus;
6. Flexor digitorum profundus;
7. Flexor pollicis longus;
8. Pronator quadratus.

### — 35 —

Dorsal-Radial group:

(1) brachioradialis;
(2) extensor carpi radialis longus;
(3) extensor carpi radialis brevis;
(4) extensor digitorum communis;
(5) extensor digiti quinti proprius (minimi digiti);
(6) extensor carpi ulnaris;
(7) supinator (s. radii brevis);
(8) abductor pollicis longus (extensor ossis metacarpi pollicis);
(9) extensor pollicis longus;
(10) extensor pollicis brevis;
(11) extensor indicis proprius;

In dissecting these muscles use care not to disturb course and branches of the nerves and arteries of the forearm. *Superficial ulnar artery?* Study relation of tendons to the bony landmarks of the wrist and compare with living arm. Avoid injury to *tendon sheaths.*

### — 36 —

HAND. Note character and attachments of *palmar aponeurosis.* Note insertion of palmaris longus. Identify *palmaris brevis muscle* and its attachment to the skin. The palmar aponeurosis must be removed in order to clean and identify the muscles of the hand.

Notice synovial sheaths of the long tendons of the hand. Explore their interior with probe, and determine their extent and intercommunication. Weeping sinew?

Muscles of Little Finger (digiti quinti):

(1) abductor;
(2) flexor brevis;
(3) opponens;

Muscles of Thumb:

(1) abductor pollicis brevis;
(2) opponens pollicis;
(3) flexor pollicis brevis;
(4) adductor pollicis.

Study blood vessels and nerves of hand.

### — 37 —

Notice the *vaginal* and *annular* ligaments of the fingers. These should be opened and the tendons of the long flexors studied.

Study origin, insertion and action of *lumbricales* and *interossei.* Study nerve supply of all the muscles of the hand.

Where the hand is rigid and the fingers bent it is advisable to divide the transverse ligaments at the metacarpophalangeal joint and forcibly spread apart the metacarpal bones. In this way the insertion of the lumbricales and interossei can be fully exposed. In other cases the long tendons may be divided at the wrist and this will allow the straightening of the fingers. The dissection of the hand is not completed until every finger is cleanly dissected and the nerves are traced to the finger tips.

### — 38 —

After completing the hand the dissector should make a schematic drawing showing the brachial, radial and ulnar arteries, their principal branches, and the formation of the palmar arches.

Review all the muscles of the upper extremity and make a list showing what muscles are supplied by each of the following nerves: (1) *axillary;* (2) *radial;* (3) *median;* (4) *musculocutaneous;* (5) *ulnar.* Dissectors of the left arms should now remove all the nerves and arteries of the arm, and pin them out on boards as described for the leg in Section 28.

## — 39 —

On specimens from which the nerves and arteries have been removed the ligaments and articulations of the shoulder, elbow and wrist joints should now be studied. The relations of muscles and tendons to the joints should be noticed; after which they are removed and the joint examined. Notice capsule and the various accessory strengthening ligaments. The joint is then opened and its interior examined. The shoulder joint is best opened by an incision through the posterior wall.

SHOULDER JOINT:

(1) articular capsule;
(2) coracohumeral ligament;
(3) glenohumeral bands;
(4) glenoid cartilage;
(5) long head of biceps and other muscles;
(6) synovial membrane.

## — 40 —

ELBOW JOINT (Three articulations—humero-ulnar, humero-radial, and radio-ulnar):

(1) articular capsule;
(2) collateral ulnar ligament (int. lateral lig.);
(3) collateral radial ligament (ext. lateral lig.);
(4) annular ligament of radius (orbicular lig.);
(5) synovial membrane.

Note points of difference between elbow joint and knee joint.

Radio-ulnar articulation:

1. Proximal joint:
   (1) annular ligament (orbicular lig.);
   (2) synovial membrane.
2. Intermediate ligaments:
   (1) oblique ligament;
   (2) interosseous membrane.
3. Distal joint:
   (1) articular disc (triangular cartilage);
   (2) anterior radio-ulnar ligament;
   (3) posterior radio-ulnar ligament;
   (4) Synovial membrane.

WRIST JOINT:

(1) articular capsule;
(2) radial collateral ligament (ext. lateral lig.);
(3) ulnar collateral ligament (int. lateral lig.);
(4) volar radio-carpal ligament (ant. lig.);
(5) dorsal radio-carpal ligament (post. lig.);
(6) synovial membrane.

# DISSECTION OF THE ABDOMEN AND PELVIS

## — 1 —

Abdominal Wall. Before proceeding with the dissection notice the following surface markings and bony landmarks:

Interchondral articulation of 7th, 8th and 9th ribs.

Xiphoid process.

Umbilicus. What does it represent?

Anterior superior spine, and crest of Ilium.

Pubis.

Inguinal ligament.

[illegible] Pencil!
Striae gravidarum
Linea alba
Linea semilunaris
Linea Transversae
Inguinal

Identify the nine abdominal regions and their boundaries:

| | | |
|---|---|---|
| Right hypochondriac | Epigastric | Left hypochondriac |
| Right lateral abdominal | Umbilical | Left lateral abdominal |
| Right hypogastric | Pubic | Left hypogastric |

An optional method of subdividing the abdominal region consists in dividing it into right and left upper and lower quadrants by a vertical and horizontal line through the umbilicus.

Make the following incisions: (1) median line from xiphoid process to pubis; (2) from xiphoid process lateralwards around side of body; and (3) from pubis lateralwards along inguinal ligament to crest of ilium. Reflect skin flaps thus outlined.

## — 2 —

Superficial Fascia of Abdomen. Identify its two layers in the lower region of abdomen: (1) more superficial layer, fatty and continuous with the rest of the superficial fascia of body—Camper's fascia; (2) Deeper layer, membranous and attached along line of inguinal ligament—Scarpa's fascia. It is the deeper layer that is especially developed in the median line to form fundiform ligament of penis. The attachments of Scarpa's fascia should be carefully noted.

The identification of the nerves and blood vessels traversing the superficial fascia may be done before or after its reflection. In fat subjects the latter is the better method. Note extensive plexus of blood vessels covering whole abdomen. Commence the reflection of fascia in the median line and proceed outward, picking up the nerves and vessels from the under surface, after which they are dissected out and left in position.

SUPERFICIAL NERVES:

Anterior and lateral cutaneous branches of 8th, 9th, 10th and 11th Intercostal nerves.

Terminal branches of Iliohypogastric nerve.

SUPERFICIAL VESSELS:

Superficial epigastric artery and vein.

Branches of Superficial circumflex iliac artery and vein.

Branches of External pudendal artery and vein.

Perforating branches accompanying nerves.

Thoraco-epigastric vein.

LYMPHATICS:

Note situation of Inguinal lymph glands, and the course of the lymph vessels with which they are connected.

[illegible]

## — 3 —

EXTERNAL ABDOMINAL OBLIQUE MUSCLE. Remove deep fascia from fleshy portion of muscle preserving superficial nerves. The muscle should be cleaned upward to its interdigitation with the *anterior serratus* muscle and dorsally to where it disappears under the *latissimus dorsi.* Observe: (1) origin and insertion; (2) formation of *aponeurosis* and its relation to *sheath of rectus muscle;* (3) *inguinal ligament* (Poupart's); (4) *external inguinal ring,* with *crus superior* (internal pillar) and *crus inferior* (external pillar); (5) *intercolumnar fibres;* (6) *intercolumnar fascia* of spermatic cord, derived from aponeurosis; (7) *iliohypogastric* and *ilioinguinal nerves.*

To facilitate the examination of the median attachment of the aponeurosis the fundiform ligament of the penis should be separated and turned downward, which exposes the decussation of the aponeurotic fibres of the right and left sides and their attachment to pubis.

The external oblique may then be divided at its origin and reflected forward. The incision is made along its attachment to the ribs, dissecting off each interdigitation, downward along the border of the latissimus dorsi, then along the crest of the ilium to the anterior superior spine. Here the aponeurosis is divided transversely to the point where it becomes adherent to the sheath of the rectus and then is separated along its attachment to the sheath downward to the symphysis pubis, preserving the external ring for further study. This incision is facilitated by advancing the fingers under the aponeurosis and loosening it from the structures beneath, while the incision is being made.

External spermatic. Subserosum.
Infundibuliform. Processus vaginalis. Tunica Vaginalis.
transversalis. congenital hernia, funicular sac

— 4 —

Same as External obl.

INTERNAL ABDOMINAL OBLIQUE MUSCLE. Clean all deep fascia from its surface. Observe structure, direction of fibres, origin, insertion and nerve supply. Determine its relation to *inguinal ligament, inguinal canal* and internal *inguinal ring.* What is meant by "conjoint tendon"? Identify *triangular fascia* (Colles' reflected ligament).

434

genit crural.

CREMASTER MUSCLE. Determine its relation to Int. abd. oblique muscle. Find genital branch of *genito-femoral nerve* (Genitocrural).

[illegible]

Since the testis in its descent passes through the abdominal wall and carries down into the scrotum elements from the different layers which form constituent parts of the spermatic cord, these should now be studied and their connections with the abdominal wall determined. Read descent of testis.

1387

— 5 —

SCROTUM (analogous to labia majora in female). Make incision from ext. inguinal ring to tip of scrotum in a line with spermatic cord, and study sucessive layers. (Nerves and blood vessels?)

Layers:

1. Skin.
2. Tunica dartos (superficial fascia)—septum scroti.
3. Intercolumnar fascia (external spermatic).

raphe

1054

4) Cremasteric :

4. Cremasteric fascia.
5. Infundibuliform fascia (tunica vaginalis communis).
6. Tunica vaginalis (tunica vaginalis propria).

(Layers 3, 4, 5, and 6 constitute the special coverings of the spermatic cord).

SPERMATIC CORD. Expose following constituents:

(1) ductus deferens (vas deferens);
(2) deferential artery and veins;
(3) testicular artery (spermatic);
(4) testicular veins—Pampiniform plexus;
(5) coverings 3, 4, 5, and 6 as above;
(6) nerves:
  a. genital branch of genito-femoral;
  b. branches from ilio-inguinal.

Preserve connections of testicle and keep it covered by layers of the abdominal wall so that it may be studied later.

— 6 —

The internal abdominal oblique muscle may now be divided in a similar way to the external abdominal oblique, being careful not to include fibres of the subjacent muscle.

TRANSVERSALIS ABDOMINIS MUSCLE. Notice its origin, insertion and direction of fibres. Notice particularly its relations: anteriorly, to sheath of rectus; posteriorly, to lumbar fascia; and inferiorly, to conjoint tendon (fusion of int. abd. oblique and transversalis). *Falx inguinalis* (tendinous portion of conjoint tendon).

Trace *iliohypogastric* and *ilioinguinal nerves.*

cont. of lower
epigastr.
7-12 Th.
ilio hy.
ilio ing.

After completing the study of the attachments of the transversalis it may be divided in a similar way to the int. and ext. oblique muscles. This exposes the *transversalis fascia* and *peritoneum.*

8-12 Th N.

— 7 —

RECTUS ABDOMINUS MUSCLE. The sheath inclosing this muscle should be opened by a vertical incision along the median line of the sheath. Study the formation of the sheath, noticing the difference in its structure above the umbilicus and below it. What are the contents of the sheath?

inscriptiones tendineae

Structure of rectus muscle. Lineae transversae (significance?).

PYRAMIDALIS MUSCLE. Linea alba. 11-12 Thor N.

Divide rectus muscle at level of umbilicus. Reflect the ends and examine the posterior portion of the sheath. *Linea semicircularis* (fold of Douglas). Identify origin and anastomosis of the *inferior* (deep) and *superior epigastric arteries.*

## — 8 —

In order to enable the dissector of the arm to complete its detachment, the body is now turned over, face downwards, and the dissection of the back muscles and the spinal cord is begun. Before turning replace layers of abdominal wall and sew skin flaps in place. Make the following incisions: (1) from last thoracic spine downwards in median ilne to tip of coccyx; (2) from coccyx obliquely outwards in a curved line along crest of ilium. Reflect the skin flap thus outlined, being careful to preserve superior cluneal nerves.

LATISSIMUS DORSI MUSCLE. Clean the muscle and demonstrate its relations to lumbodorsal fascia. Determine boundaries of *lumbar triangle* (triangle of Petit). Study pictures showing transverse sections through muscles of lumbar region, showing layers of lumbodorsal fascia and their relation to the tendons of origin of muscles of abdominal wall.

Separate latissimus dorsi at its origin from lumbodorsal fascia and reflect outward. Notice insertion of *serratus posterior inferior* muscle into its under surface. Divide the latter at its insertion and complete the reflection of the latissimus dorsi, separating its slips of origin from the lower ribs and crest of ilium. Notice more carefully the tendinous origins of the transverse, internal oblique, and external oblique abdominal muscles.

## — 9 —

SERRATUS POSTERIOR INFERIOR MUSCLE. Examine its fleshy insertions into the ribs, after which it may be removed. The long muscles of the back are now studied. These are dissected in cooperation with the dissector of the arm. In dissecting the long muscles of the back the work may be delayed by the dissectors of the head. This time may be utilized for study of the osteology of the vertebral column, pelvic girdle and ribs.

SACROSPINALIS MUSCLE (Erector spinae).

Iliocostalis:
- (1) lumborum;
- (2) dorsi;
- (3) cervicis.

Longissimus:
- (1) dorsi;
- (2) cervicis;
- (3) capitis (trachelomastoid).

Spinalis:
- (1) dorsi;
- (2) cervicis;

— 10 —

The different portions of this muscle are separated into their three main longitudinal bundles, according to the direction and attachment of the fibres. Note aponeurotic character of its origin. Nerve supply? After the muscle has been completely exposed it may be removed.

SEMISPINALIS MUSCLE (first layer of short muscles).
- (1) dorsi;
- (2) cervicis;
- (3) capitis (complexus).

After the origins and insertions of this muscle have been studied it may be removed.

— 11 —

MULTIFIDUS MUSCLE. (Second layer of short muscles). After the origins and insertions have been studied the muscle is to be removed.

ROTATORES LONGI and BREVES.

LEVATORES COSTARUM. 1-2

INTERSPINALES.

INTERTRANSVERSARII.

After identifying the chief characteristics of these muscles they may be removed, and the vertebrae cleaned. Study osteology of cervical, thoracic and lumbar vertebrae, and of the sacrum. Study the ligaments of the vertebrae. With chisel and bone cutters open the spinal canal by cutting through the pedicles on each side and removing the articular processes and arches of the vertebrae. *Ligamentum flavum?*

## — 12 —

Examine *dural sheath* which incloses the spinal cord and its nerve roots. Notice venous plexus surrounding the sheath. Trace the extensions of the dural sheath outward over ~~the~~ ganglia, cutting away bone where necessary, and notice its direct continuation as a sheath for the nerve trunks of the lumbosacral plexus. Trace dural sheath caudally to tip of sacrum. 771

The dura may now be slit open with scissors. Note the character of the three membranes (*meninges*) enveloping the cord. *Subdural* and *subarachnoid spaces? Ligamentum denticulatum?* Remove the arachnoid coat and examine the pia mater with its contained blood vessels. The pia mater closely invests the cord and can't be removed without injuring it.

## — 13 —

fila radicularia

264

SPINAL CORD. In common with the other dissectors study the form, length and enlargements of the cord. Note *conus medullaris* and *filum terminale*. Why does the spinal cord end at level of first lumbar vertebra instead of extending the full length of the spinal canal? Study transverse sections of the spinal cord made at different levels. Note arrangement of gray and white matter. Study the blood supply of spinal cord. 712 771

Note the *spinal nerve roots* (anterior and posterior) and their connection with the cord. Trace them peripherally and determine their mode of exit from spinal canal. What is meant by spinal root ganglia? Note the formation of *nerve-trunks*. Identify anterior and posterior rami (primary divisions). Double ganglia? Why are the lumbar and sacral ganglia situated so far from the attachments of their nerve roots to the cord? *Cauda equina.* Lumbar puncture region?

Trace last two intercostal nerves completely from spinal cord to termination. Determine the roots of the *lumbar plexus*. *Quadratus lumborum*, origin, insertion and nerve supply.

— 14 —

Trace continuation of sacral nerves into the formation of the *sacral plexus* and sciatic nerve. To completely expose this connection a portion of the ilium and sacrum must be cut out with chisel and bonecutter. Make a glass plate tracing of the kidneys showing their relation to the eleventh and twelfth ribs, the iliac crests, and the pedicles of lumbar vertebrae. By this time the dissector of the leg should have already reflected the glutaeus maximus. Notice particularly the origin and course of the *pudendal nerve* (pudic). The pudendal nerve, as it arises from the plexus, will frequently be found subdivided into its terminal branches: a, inferior haemorrhoidal; b, perineal; c, dorsal nerve of penis. The body can't be turned over until the dissector of the leg completes his study of the muscles of the hip. In the meantime the pudendal nerve may be traced forwards under the *sacro-tuberosal ligament* into the ischio-rectal fossa, and the latter region dissected.

10

— 15 —

It is well at this time to review on demonstration skeleton the bony landmarks of the outlet of the pelvis.

ISCHIO-RECTAL FOSSA. With the legs well apart, reflect skin with median incision encircling the anal orifice. Carefully remove the fat and expose following structures:

(1) external sphincter ani muscle;
(2) lower end of rectum;
(3) levator ani and coccygeus muscles;
(4) superficial perineal and inferior haemorrhoidal nerves;
(5) internal pudendal and inferior haemorrhoidal arteries.

Determine the boundaries of the ischio-rectal fossa. 107r. [illegible]

— 16 —

The body is then turned over on its back and the study of the abdominal wall resumed. After the layers of the abdominal wall and the sheath of the rectus muscle have been reviewed the peritoneal cavity may be opened up and the wall examined from its internal aspect. Make a median incision through whole wall from sternum to umbilicus, and then a transverse incision cutting all structures between umbilicus and iliac crests. The lower portion of the abdominal wall is then raised forward and its inner (peritoneal) surface examined, without disturbing the position of the viscera. Compare with picture in Spalteholz, Fig. 599. Identify the following:

### FOLDS.

1. Median umbilical (Urachus).
2. Lateral umbilical (obliterated umbilical arteries).
3. Epigastric (Inf. epigastr. arts.).

### FOSSAE.

1. Supravesical.
2. Median inguinal.
3. Lateral inguinal.

Note variations in different bodies.

After these structures have been seen the median incision through the abdominal wall may be continued from umbilicus to pubis. Notice situation of *femoral ring* and *internal inguinal ring*.

INGUINAL CANAL. Length, direction and boundaries. What is the character, shape and situation of the internal inguinal ring? Study formation and attachments of the inguinal ligament (Poupart's). *Ligament lacunare* (Gimbernat's). *Hesselbach's ligament* (interfoveolar). *Hesselbach's triangle. Reflex ligament of Colles. Falx inguinalis.*

### — 17 —

Trace ductus deferens from testicle to brim of pelvis. Notice how it is joined by testicular artery and vein to form the spermatic cord.

Replace the layers of the lower abdomen and study the "weak spots" and their relation to direct and indirect inguinal hernia.

INGUINAL HERNIA. 17(c)

A. Oblique or External (the common form).
   Coverings: (1) at internal ring;
   (2) in inguinal canal;
   (3) at external ring or outlet.

B. Direct or Internal (the rarer form).
   Coverings.

In cooperation with the dissector of the leg study the parts concerned in *femoral hernia.* Notice character and contents of the *femoral ring.*

— 18 —

The examination of the abdominal viscera is now begun. Before their position has been disturbed make a tracing with glass plate, and transfer it on paper, showing the topography of the following organs:

1. Stomach (to be colored green).
2. Liver and gall bladder (red).
3. Colon, three divisions (yellow).

Indicate the nine abdominal regions, umbilicus, costal margin, inguinal ligaments and anterior superior iliac spines. Where the colon does not appear on the surface it should be shown by dotted lines. Omit entirely the *great omentum.*

— 19 —

PERITONEUM. Read development of peritoneum and formation of two peritoneal sacs.

Distinguish between *omentum, mesentery,* and *ligament.* Make a list of each.

*Peritoneal fossae* (the more important ones).

Caecal region:
  (1) retrocolic; 1667
  (2) ileocolic;
  (3) ileocaecal. 1467

Duodenojejunal flexure:
  (1) superior duodenal;
  (2) inferior duodenal; 1644
  (3) (paraduodenal).

Sigmoid region: intersigmoid.

LESSER PERITONEAL SAC (*Bursa omentalis*). Examine the *epiploic foramen* (Winslow) and identify structures forming and adjoining it. The lesser sac should then be explored and the organs forming its boundaries identified. In order to do this an incision should be made through great omentum along greater curvature of stomach. Note the four possible ways of entering the lesser sac.

— 20 —

Trace the peritoneum as follows, noticing its reflection on the different organs:

(1) median sagittal plane;
(2) transverse horizontal plane;
  a. level of foramen of W;
  b. level of umbilicus.

Determine relation of peritoneum to the following abdominal organs, i. e., what part and to what extent each organ is provided with peritoneal covering:

1. Stomach, duodenum, jejunum, ileum, caecum, appendix, three divisions of colon, sigmoid flexure, and rectum.
2. Liver and gall bladder.
3. Pancreas.
4. Spleen.
5. Right and left kidneys.
6. Bladder.
7. Large blood vessels.
8. Uterus and broad ligament in female subjects.

It is important to identify all these structures through the peritoneum, just as the surgeon has to. For this purpose it is well for comparison to study a picture in which these viscera are all exposed, e. g., Sabotta, Fig. 413.

— 21 —

After studying the peritoneal covering of the different organs on his own table the dissector should visit all the other tables for comparison, studying the variations in the organs themselves, the mesenteries and omenta. *Meckel's diverticulum?*

Reflect peritoneum from the right side of mesentery and expose:

(1) superior mesenteric artery and all its branches;
(2) superior mesenteric vein;
(3) lymphatic vessels and mesenteric lymph glands;
(4) nerves.

Notice the manner of distribution of these structures to the intestinal wall. Avoid injury to tributaries of mesenteric and coeliac veins as these must be studied with the portal system, Section 29.

## — 22 —

Complete the dissection of the blood vessels, lymphatics and nerves of the jejunum, ileum, and colon as far as the beginning of the rectum, exposing:

(1) ileocolic artery;
(2) artery of appendix;
(3) right colic artery (branch of ileocolic?);
(4) middle colic artery;
(5) left colic artery;
(6) inferior mesenteric artery.

Avoid injuring testicular artery (int. spermatic).

## — 23 —

INTESTINES. For convenience in studying the intestines they should be removed. Before doing this notice carefully the relation of the colon to the viscera, especially the right and left kidney and the liver. Place double ligature around jejunum near junction with duodenum and divide between the two. Divide the colon at the beginning of the rectum in the same way. (Boundary between colon and rectum?) Remove colon and small intestine together by dividing mesentery near its junction with intestinal wall. Notice three characteristic external differences in appearance between large and small intestine.

Carry intestines to sink and with scissors slit open intestine along line of mesenteric attachment except for four inches each side of ileocaecal valve. Observe character of contents in different portions of intestine. Wash off contents, and study character of mucus membrane of different parts of intestine. Note plush-like appearance of small intestine due to *villi* as contrasted to the smooth appearance of large intestine where they are absent. Identify and note location and character of *Peyer's patches.* Determine difference between:

(a) valvulae conniventes (small intestine);
(b) semilunar folds (large intestine).

## — 24 —

For a more careful examination of the character of the intestinal mucus membrane the dissector should cut out pieces of the wall [(1) stomach; (2) jejunum; (3) colon] one-half inch square and study under water with a low-power lens and good illumination. Learn to distinguish between them by study of villi and orifices of glands. Compare as many specimens as possible.

Dissect under water a piece of jejunum about two inches square showing:

(1) peritoneal coat;
(2) longitudinal muscular coat;
(3) circular muscular coat;
(4) submucus coat and arteries;
(5) mucus coat.

In studying the structure of the wall of the alimentary canal it is desirable that the dissector read up the process of digestion in a text-book of physiology.

Examine *ileo-caecal junction.* Trace caecal termination of the three longitudinal bands of the colon:

(a) meso-colic band;
(b) omental band;
(c) free band.

Open caecum along line of free border and examine interior, particularly the *ileo-caecal valve* and the *orifice of the appendix.* Slit open appendix and study character of its walls.

All abdominal viscera after being studied should always be carefully preserved and kept moist for purposes of review.

## — 25 —

The dissector now studies the different portions and relations of stomach and duodenum.

STOMACH. Compare the shape and position of the stomach in different bodies. Determine the structures with which it is in contact in front and behind. Examine its continuity with oesophagus and duodenum.

Notice:
- (1) fundus;
- (2) lesser curvature;
- (3) greater curvature;
- (4) cardiac portion;
- (5) pyloric antrum;
- (6) pylorus.

Dissect arteries to stomach and duodenum by either drawing stomach down or raising it up. Veins?

### — 26 —

### Coeliac Artery.

1. Left gastric (coronary).
2. Hepatic:
    - (a) right gastric or pyloric;
    - (b) hepatic proper;
    - (c) gastro-duodenal.
3. Splenic.

Make a drawing, natural size, showing exact shape and size of the stomach and the manner in which these branches are given off.

Trace Vagus nerves to their termination on stomach wall. Difference between vagus and splanchnic nerves? Open stomach and study interior. Study transition between cardiac end and oesophagus. Study pyloric end and transition to duodenum. What elements enter into formation of pyloric valve? Arrangement of muscle layers of stomach?

### — 27 —

Trace splenic artery and vein to spleen.

130 Main

**Spleen.** Examine its size, shape and relations. Examine specimens on all the other tables for determining the variations. Accessory spleens? The vessels at the *hilum* of the spleen may then be divided and the spleen removed and examined more closely. Notice character of its capsule. Make incision and examine cut surface. What is a haemolymph gland and what is supposed to be their function? 704 Main.

19th May

PANCREAS. Recognize the different portions of the pancreas and their relations to what lies in front and behind. Notice particularly its relation to *portal vein* and *superior mesenteric artery.*

— 28 —

For purposes of review it is desirable that the dissector should make a memorandum, preferably a diagram (front and back view of each organ giving contact areas), of the chief relations of each of the following organs: (a) stomach; (b) spleen; (c) pancreas; (d) duodenum; and (e) right and left kidneys. Compare them as identified on the table with descriptions in text book.

Dissect out *pancreatic duct* beginning at splenic end, where it is easier found and less damage is done in practicing its dissection. Trace it carefully toward intestinal wall. This leads the dissector also directly to the *bile duct* (ductus choledochus). In front of the bile duct is there an *accessory pancreatic duct?*

BILIARY TRACT. Slit open the descending and inferior portions of the duodenum and locate the papilla where both the pancreatic and bile ducts empty. By introducing fine probes in the ducts a short distance from the wall of intestine it can be shown how they emerge at the papilla.

— 29 —

The common bile duct should be dissected back to its source. Demonstrate *hepatic* and *cystic ducts.*

PORTAL VEIN. Complete the study of this vein, noting its size and relations. Make a drawing showing the formation of portal vein and size of all its tributaries.

In removing the liver it may be taken out together with the duodenum and pancreas, thus preserving the connections of the portal vein and bile duct. In the majority of cases, however, it is more satisfactory to proceed as follows:

Put finger through epiploic foramen (Winslow), and after identifying its boundaries, divide the structures forming its anterior wall, and then proceed to the study of the liver.

LIVER. Study those portions of the liver and its *ligaments* that can be identified in situ. Note remains of *umbilical vein.* Then the *coronary ligament* may be divided and the liver removed, being careful not to also remove the right suprarenal gland. In some bodies the hepatic portion of the inferior vena cava may be removed with the liver; in others it is to be left in place.

### — 30 —

On removing liver study its lobes, fissures, surface relations, peritoneal and nonperitoneal surfaces. Examine all arteries, veins and ducts connected with liver. Examine *gall bladder,* and cystic and hepatic ducts. Open gall bladder and examine its interior. Note *spiral valve* in cystic duct.

Make incision into liver substance and examine cut surface. Distinguish between interlobular and intralobular vessels. Notice distribution of Hepatic Trinity:

(1) portal vein;
(2) hepatic artery;
(3) bile duct.

The dissector should now remove stomach, duodenum and pancreas and preserve them for review purposes.

Expose the kidneys and suprarenal glands together with their veins and arteries. Supernumerary renal arteries? Note the sympathetic nerves. Expose the *ureters* and the *testicular arteries* and *veins* (internal spermatic). Review all the branches arising from the front of the abdominal aorta.

### — 31 —

KIDNEY. Loosen the kidneys from their bed and determine their relation to other organs. Make a diagram showing front and posterior surfaces of the right and left kidneys with contact surfaces indicated, as found in the subject being dissected. Note relation of structures entering *hilum.* Trace course of blood through kidney substance.

Remove *suprarenal glands,* noting their shape and blood supply. Make an incision through them and observe characteristic arrangement of cortex and medulla.

On one side of the body a median section should be made through kidney and the appearance of the cut surface carefully studied with the low power lens if possible.

Note the following:

(1) kidney capsule;
(2) ureter and renal pelvis;
(3) calyces;
(4) medullary substance and renal papillae;
(5) cortical substance;
(6) medullary rays;
(7) columns of Bertini;
(8) glomeruli (Malpighian bodies);
(9) interlobar blood vessels.

The dissection of the *sympathetic plexus of nerves* and the *lymphatic vessels* should now be completed. The lymphatics should be traced along aorta to where they form the *receptaculum chyli*. In cooperation with dissector of the thorax trace its passage through diaphragm. The inferior vena cava and aorta may now be cleaned. Divide renal artery and veins. The ureter connecting one kidney with bladder should be left intact and the kidney placed in the pelvis.

## — 32 —

DIAPHRAGM. Remove fascia from under surface of diaphragm, and study its structure and attachments. Note character of:

(1) medial, intermedial, and lateral crura;
(2) medial, and lateral lumbocostal arches;
(3) aortic hiatus;
(4) oesophageal hiatus;
(5) foramen for vena cava.

Review all the structures passing through the diaphragm. Nerve supply?

The *psoas major, psoas minor* and *iliacus muscles* should now be cleaned and examined. In doing this identify the following nerves as they emerge from the substance of the psoas muscle:

1. Genitofemoral.
    (a) external spermatic;
    (b) lumboinguinal.
2. Iliohypogastric.
3. Ilioinguinal.
4. Lateral femoral cutaneous.
5. Femoral.
6. Obturator.

Examine the *sympathetic trunk* and display the *rami communicantes.*

## — 33 —

In cleaning these muscles follow the *iliopsoas* down as it passes under the inguinal ligament. Note the arrangement of the *iliopectineal fascia* and the formation of the *vascular lacuna.* Review the *femoral ring* and *Gimbernat's ligament.* Does femoral nerve pass through vascular lacuna? Insertion of iliopsoas? Study figure 370 in Spalteholz.

LUMBAR PLEXUS. These nerves have been exposed in part in an earlier dissection. They may now be completed by the removal of the psoas muscle. Make a schematic drawing of the first to fourth lumbar nerves, showing the plexus and its chief branches.

## — 34 —

The dissector now begins the study of the pelvic and genital organs and it is well during their dissection to frequently consult the demonstration skeleton for review of the bony landmarks. Before the relations have been disturbed the *pelvic peritoneum* should be reviewed and its reflection upon the pelvic organs determined. Note the following:

### MALE.

1. Recto-vesical pouch.
2. Pararectal fossae.
3. Paravesical fossae.
4. Recto-vesical fold (sacro-genital fold).
5. Transverse vesical fold.
6. Pubo-vesical folds.

### FEMALE.

1. Vesico-uterine pouch.
2. Recto-uterine pouch of Douglas.
3. Broad ligament:
    (a) mesovarium;
    (b) mesosalpinx;
    (c) mesometrium.
4. Ovarian ligament proper.
5. Ovarian suspensory ligament.
6. Round ligament.
7. Transverse vesical fold.

After the general topography of the pelvic organs has been recognized the dissector begins the external genitalia and the urogenital triangle.

PERINEUM. Identify and compare the *external genitalia* in male and female subjects. Review structure and arrangement of scrotum, spermatic cord and testis. Complete the reflection of the skin and superficial fascia of perineum and expose *perineal nerve* and *artery* and their *posterior scrotal branches.*

### — 35 —

Identify deep layer of superficial fascia (Colles' fascia) and trace its attachments. This fascia may then be removed and the following muscles exposed:

1. Bulbocavernosus (ejaculator urinae).
2. Ischiocavernosus (erector penis).
3. Superficial transverse perineal.

Observe same muscles in female subject. These muscles are then reflected to expose the *crura of the penis* (or clitoris), the bulbous portion of the *urethra,* and the *inferior fascia of the urogenital trigone* (superficial layer of triangular ligament).

PENIS. Study structure of penis. In some specimens the skin and superficial fascia should be reflected, the *dorsal arteries, nerves* and *vein* identified, and the erectile bodies separated and their attachments determined:

(1) corpora cavernosa of the penis;
(2) corpus cavernosum of the urethra (corpus spongiosum).

In other specimens where the penis is well hardened with formalin cross sections should be made through (a) front part of glans; (b) posterior part of glans; and (c) through body of penis, and the structures studied as they appear in a cut section. Compare penis and clitoris.

## — 36 —

The bulbous portion of the urethra should be left intact so that its connection with prostate and bladder may be studied. This is done by separating it entirely from the corpora cavernosa. The latter together with their crura are detached from the pubic arch, dissecting from the front backwards. While doing this notice particularly the course of the *dorsal artery* and *nerve* of the penis. Notice connection of *dorsal vein* with pudendal venous plexus.

UROGENITAL TRIGONE (triangular ligament). Study its structure and attachments.

1. Inferior fascia (anterior layer).
2. Superior fascia (posterior layer).
3. Contents:
    (a) deep transverse perineal muscle;
    (b) sphincter urethrae muscle;
    (c) bulbo-urethral gland (Cowper's).
4. Transverse ligament of pelvis.

Examine models of perineum.

## — 37 —

In order to facilitate the dissection of the pelvic viscera two procedures are to be recommended: (a) In some of the bodies make a median section (in male subjects slightly to one side of median line) with saw and knife through whole pelvis, preserving urethra intact; and (b) in the other bodies disarticulate one of the innominate bones at the symphysis pubis and carefully remove it, leaving the viscera together with the levator ani all in position. This makes it possible to study the organs both as they appear in median section and as they appear intact.

RECTUM. Note its relation to the other pelvic organs, and to the *levator ani muscle* and pelvic peritoneum. Its examination is facilitated by separating it backward from the genitourinary organs. Where it is divided in the median line note the character of the interior: (a) *transverse rectal folds;* (b) *columns of Morgagni;* (c) *rectal sinuses;* and (d) *haemorrhoidal ring.* The mucus membrane should be partly reflected to expose the *internal haemorrhoidal plexus.* Note the character of the musculature of the rectum, especially the *internal* and *external sphincter muscles.* Determine the blood and nerve supply of the rectum.

## — 38 —

FEMALE GENITAL ORGANS. Examine the vagina and determine its relations to the bladder and rectum. Note the *fornix* of the vagina. Study the structure of the *uterus,* noting the division into *cervix* and *body.* Note the character of the different orifices of the uterus. Significance of *round ligament?*

Carefully dissect out the *uterine* and *ovarian arteries.* Note relation of uterine artery to the ureter. Blood supply of the vagina?

UTERINE OR FALLOPIAN TUBES:

(a) uterine portion;
(b) isthmus;
(c) ampulla;
(d) infundibulum;
(e) fimbria.

Note the character of the ovary. What is its relation to the peritoneum? Make an incision into it and note the appearance of the cut surface. *Graafian follicles? Corpus luteum?*

What is meant by (a) *epoophoron;* (b) *vesicular appendix* (hydatid) *of Morgagni;* and (c) *paroophoron?*

URINARY BLADDER AND PROSTATE. In order to expose the lumen of the urethra and its connection with the bladder, it should be slit open along its roof and the incision continued up the median line of the front wall of the bladder. This preserves the important structures situated in the floor of the bladder and urethra. In the subjects where the pelvis was divided in the median line it is only necessary to open the urethra.

Examine the bladder in different subjects, noting variation in shape and size. Note the loose attachment to the pubis and its bearing on distention of the bladder and suprapubic cystotomy. Study the structure of its wall and character of its mucus membrane. Note particularly the base of the bladder and the manner in which the *ureters* open into it. *Vesicle triangle? Uvula?* Review the relations of the ureter from kidney to bladder.

Note size and shape of the *prostate.* Make out its lobes, and its relation to the neck of the bladder. Make an incision into it and determine its structure. Do different parts of it vary in structure?

## — 39 —

URETHRA. Determine its three different portions and note character, length and size of lumen of each portion. Note the structures found in the floor of the prostatic portion:

(1) prostatic ducts;
(2) utriculus prostaticus;
(3) colliculus seminalis (crista urethrae, verumontanum);
(4) orifices of ejaculatory ducts.

Care should be exercised in introducing probes into these orifices as they are easily torn. The ejaculatory ducts can be demonstrated to better advantage by following them from the outside and forwards through the substance of the prostate. A small probe may be introduced into the duct and by carefully pushing it forward it is possible to demonstrate the opening into the urethra.

SEMINAL TRACT. Study this whole tract, including the structure of the (a) *testis;* (b) *epididymis;* (c) *ductus deferens;* (d) *seminal vesicles;* and (e) *ejaculatory duct.* Review the course and relations of the ductus deferens.

## — 40 —

Make a schematic drawing of *hypogastric artery* (internal iliac), showing the artery and its branches in natural size. The viscera to which the arteries run need not be included. To simplify the dissection the veins may all be removed.

The genito-urinary organs may now be removed and the inner walls of the true pelvis studied. Examine the *sacral plexus* of nerves and note the communication with the pelvic sympathetics. Review the attachments and structure of the *levator ani* and *coccygeus* muscles. Note the *arcus tendineus* (white line).

OBTURATOR INTERNUS MUSCLE. Note the character of the fascia covering it and determine its origin, insertion, action and nerve supply. This muscle should also be examined by the dissector of the leg. Examine the *obturator canal.*

# DISSECTION OF HEAD, NECK AND THORAX

## — I —

Note the surface anatomy of the neck, including the sternocleidomastoid muscle, hyoid bone, thyroid and cricoid cartilages, and trachea.

Make the following incisions: (1) from symphysis of mandible downwards in median line of neck to sternum; (2) from sternum upwards along anterior border of sternocleidomastoid muscle to mastoid process; (3) in common with the dissector of the arm, from sternum along clavicle to acromion process. These two triangular flaps are reflected upward, being careful to leave the subjacent superficial fascia and platysma myoides muscle intact. During the first few days the dissectors of the neck and the dissectors of the pectoral region work in crowded quarters, therefore it is necessary for them to alternate to some extent in their dissection. The dissectors of the neck can apply this time to advantage on their osteology.

PLATYSMA MYOIDES MUSCLE. Clean surface of this muscle up over margin of mandible and determine its relation to superficial fascia and skin. In cooperation with dissector of arm identify the fibres extending downward over clavicle. Note the superficial nerves piercing the muscle in the region of the clavicle. After its outlines have been determined the muscle should be bisected transversely and the halves carefully reflected upward and downward, without injuring the superficial nerves and *external* and *anterior jugular veins*, which lie directly under it. Notice facial nerve supply.

### — 2 —

SUPERFICIAL CERVICAL NERVES. (Cutaneous branches of cervical plexus.)

Ascending—1. *Lesser ocipital.*
2. *Great auricular.*

Transverse—1. *Cervical cutaneous.*

Descending—1. *Supraclavicular*:
a. anterior (sternal);
b. middle (clavicular);
c. posterior (acromial).

Determine connections of *external* and *anterior jugular veins.* Note variations in size and position in different bodies.

Read about deep fascia of neck, noting its characteristics as the dissection of the neck progresses.

3 49 STERNOCLEIDOMASTOID MUSCLE Clean this muscle over its whole extent, being careful to preserve the nerves. Determine its insertion and double origin. Action?

### — 3 —

1317 Read about the *anterior* and *posterior triangles* of the neck and their contents.

Note muscles forming floor and boundaries of anterior triangle without disturbing them.

POSTERIOR CERVICAL TRIANGLE. Remove the deep fascia bridging in the space between the sternocleidomastoid and trapezius muscles and expose the contained structures. This dissection, however, must be combined with that described under Section 4. As soon as the spinal accessory nerve is found, it is desirable to complete Section 4 and after that to come back and finish Section 3.

Boundaries—
(1) sternocleidomastoid; (2) trapezius; (3) clavicle.

Contents—

(1) Spinal accessory nerve;
945 (2) muscular branches of cervical plexus (trapezius);
(3) upper border brachial plexus; 959
(4) posterior branches of supraclavicular nerves;
(5) superficial cervical artery; 663
(6) transverse scapular artery:
(7) external jugular vein;
(8) transverse cervical vein.

Floor—

(1) splenius capitis; 414
(2) levator scapulae; 358
(3) anterior, middle and posterior scalenus muscles; 353
(4) omohyoid.

## — 4 —

Spinal Accessory Nerve. After identifying this nerve it should be followed distally to where it disappears under the border of the trapezius. Then it should be followed centrally backward through the sternocleidomastoid muscle by cutting a groove through the muscle. Note branches given to the muscle and its anastomosis with the second cervical nerve.

The upper third of the sternocleidomastoid may then be removed, dissecting it free from the mastoid process. This exposes the origin of the *lesser occipital nerve.*

The lower two-thirds of the sternocleidomastoid is then reflected downwards, after dissecting out the nerves supplying it. This exposes the cervical plexus and the carotid sheath which are now to be dissected.

## — 5 —

985 Cervical Plexus. The superficial branches of this plexus have already been noted. Identify the other branches, noting particularly the *phrenic nerve* and the *ansa hypoglossi.* The latter is best found by first finding the hypoglossal nerve as it passes around posterior and lateral to, and a little above, the bifurcation of the common carotid artery, and by tracing the *descendens hypoglossi* which extends from this nerve downward

into the ansa. Trace the branches of the ansa to the different hyoid muscles. The branch to the posterior belly of the omohyoid usually enters near the central tendon. Note relation of this tendon to the cervical fascia. Note origin and insertion of sternohyoid, sternothyroid, omohyoid and thyrohyoid muscles.

CAROTID SHEATH. Study its structure and contents. In cases of enlarged thyroid gland it is advisable at this point to study it and remove it, as described under Section 7, before proceeding with the carotid sheath and deeper parts of the neck.

## — 6 —

Read about the *lymphatics* of the neck. By picking up the deep cervical glands, vessels will be found leading from them to the right and left lymphatic ducts. Note their relation to the thoracic duct. Avoid injuring *ansa subclavia* and sympathetic nerves.

THORACIC DUCT. Read about its course and identify the point at which it empties into the blood system. Variations? This communication should be carefully preserved for study later. The other lymphatics of the neck need not be preserved.

In order to more completely expose the deeper parts of the neck divide posterior belly of omohyoid and separate the sternohyoid and sternothyroid muscles at their sternal origin, preserving their nerve supply. Examine the *internal jugular vein,* divide it and reflect the ends.

## — 7 —

SUBCLAVIAN ARTERY. Note the manner in which it emerges from the thorax, its relation to the pleural dome, its relation to the scalene muscles and the first rib. Branches? Trace branches of thyrocervical trunk. Identify *vertebral* and *internal mammary arteries.* Preserve *cervical sympathetic cord* and *Ansa subclavia.*

126

THYROID GLAND. Note its shape, structure, blood supply and position and attachments. Compare with those seen on other bodies. Turn lateral lobes forward and follow branches of inferior thyroid artery to parathyroid bodies. *Pyramidal lobe* and its significance?

In cooperation with the dissector of the arm establish the connection between the cervical and brachial plexuses, and note their relation to scalene muscles. Note origin, insertion and nerve supply of the three scalene muscles. At about this time the dissector of the arm should have completed the dissection of the axilla and the body is then turned over.

## — 8 —

Make following incisions: (1) from *vertebra prominens* upward in median line through *external occipital protuberance* to vertex of head; (2) from external occipital protuberance lateralwards to pinna of ear; (3). from vertebra prominens lateralwards to acromion process. The skin flaps thus outlined are then reflected. In cooperation with dissector of arm the upper part of the *trapezius muscle* is cleaned, and attention is then given to posterior half of scalp. *N. occipitalis tertius?*

SCALP (Posterior half). Identify the different layers and their structure. In subcutaneous layer find branches of following arteries: (1) occipital; (2) posterior auricular; (3) superficial temporal. Identify following nerves: (1) great occipital; (2) smaller occipital; (3) posterior auricular (branch of what nerve?).

All fat and fascia of second layer should then be removed so as to expose posterior half of *epicranius muscle* (*occipito-frontalis*).

## — 9 —

OCCIPITALIS MUSCLE. Origin, insertion and nerve supply. Notice attachments and character of the *galea aponeurotica. Transverse nuchal muscle? Posterior auricular muscle?* The posterior auricular nerve is found close against the anterior border of the mastoid process passing up to reach the under surface of the posterior auricular muscle. The branch to the occipital muscle is only found in favorable subjects.

SPLENIUS CAPITIS AND SPLENIUS CERVICIS MUSCLES. Note their origin, insertion and action. They are then divided at their origin and reflected outward. *Ligamentum nuchae?*

Identify the *longissimus cervicis, longissimus capitis, semispinalis cervicis* and *semispinalis capitis.* Demonstrate their relation to the *sacrospinalis muscle.* Note *deep cervical artery* and *vein.*

## — 10 —

These muscles may then be removed, being careful to preserve the posterior rami of the cervical nerves, particularly the occipitalis major and tertius, which are to be traced through to their origin from the ganglia and cord. This exposes the upper end of the *multifidus muscle* and the *suboccipital triangle. Suboccipital nerve?*

Rectus Capitis Posterior Major.

Rectus Capitis Posterior Minor.

Obliquus Capitis Superior.

Obliquus Capitis Inferior.

Identify origin, insertion and nerve supply of these muscles, after which they may be removed. Note vertebral artery, and determine its relation to the vertebral vein.

## — 11 —

While the other dissectors are opening the spinal canal the dissector of the head may remove the skull cap (calvarium) and study the vault of the skull. It will be found in most cases that this has already been opened up and the brain removed before the body was brought to the dissecting room. Note the middle and posterior scalene muscles as they are removed by the dissector of the extremities.

Structure of Cranium. Notice markings on inside of skull cap: (1) blood vessels; (2) *Pacchionian depressions;* (3) groove for venous sinus.

With saw make several sections through skull cap to study its structure and distribution of the *diploë. Diploic veins? Emissary veins?*

Notice anatomical conditions that tend to minimize blows upon skull.

Dura Mater. Structure and distribution. Study shape and attachments of *falx cerebri, tentorium cerebelli, falx cerebelli* and *diaphragma sellae.* Study all the *meningeal arteries.* What is their function? How is the venous blood returned?

640
648
632

## — 12 —

SINUSES OF DURA MATER. Study their distribution, connections and tributaries. Note the regions they drain.

1. Superior sagittal.
2. Inferior sagittal.
3. Rectus (straight).
4. Transverse (lateral).
5. Superior petrosal.
6. Inferior petrosal.
7. Cavernous.
8. Sphenoparietal.
9. Occipital.
10. Intercavernous.
11. Basilar plexus.

In tracing their connections it will be found helpful to split them open when they can be easily recognized by the dark red blood stain. Preserve cavernous sinus intact for study later. The superior sagittal sinus, however, should be completely opened and its structure carefully noted. Notice *Pacchionian bodies.* Notice cerebral veins emptying into superior sagittal sinus.

Note arrangement of dura mater in the *foramen magnum, spinal accessory nerve, ligamentum denticulatum,* and *vertebral arteries.* These same structures will be presently seen from below the foramen.

Review all the vessels by which arterial blood is supplied to structures within the cranium, and the channels by which the venous blood is again returned. It is recommended at this time to study the relation of the different parts of the brain to the three cranial fossae in connection with a review of the bones that form the base of the cranium. The dissector then returns to the dissection of the spinal canal, but before doing so the cranial cavity should be packed with some moistened cloths and the scalp flaps carefully replaced so as to prevent drying of the interior of the skull. The cloths should be remoistened from time to time.

## — 13 —

The short intrinsic muscles of the cervical vertebrae are now removed, and a study made of the form and articulations of the upper cervical vertebrae, particularly of the *axis* and *atlas*.

Remove the spines and laminae of the upper three cervical vertebrae, and in cooperation with the dissector of the arm make a study of the spinal cord and its membranes.

**Spinal Cord.** After examining the structure of the dural sheath and its relation to the spinal ganglia, it may be slit open and transversely separated from the rim of the foramen magnum. Notice its continuity with the dura of the skull. Remove the arachnoid membrane. Study the anterior and posterior nerve roots and their connection with the spinal ganglia. The ganglia as they lie in the intervertebral foramina should be completely exposed by cutting away the articular processes. The first cervical ganglion is a small one and is usually absent, being destroyed in the removal of the brain.

## — 14 —

Establish the connection of the nerve roots with the cervical plexus. *Posterior rami* (posterior primary divisions)? Complete dissection of *greater occipital nerve.*

Carefully divide the posterior nerve roots near their entrance in the cord, turn back and find underneath the *spinal accessory nerve.* Do not mistake the *ligamentum denticulatum* for this nerve.

**Vertebral Artery.** In cooperation with the dissector of the arm, trace this artery throughout its whole course, using bone cutters where necessary. Represent on the demonstration skeleton the course of the vertebral artery by passing a string beginning at the point it should arise from the subclavian artery and ending where it passes through the foramen magnum. Branches of the vertebral artery?

## — 15 —

At this point the dissector leaves the neck and begins the study of the thoracic wall and the contained viscera.

372 INTERCOSTAL SPACES. Trace two or three of the upper thoracic nerves around through the intercostal spaces, noticing their relation to the ribs, intercostal muscles and blood vessels. Study the formation, branches and communications of a typical thoracic nerve. 493

Note the arrangement and distribution of the *external* and *internal intercostal muscles.* Study their relation to the *external* and *internal intercostal ligaments.*

The intercostal structures are now all removed to expose the parietal layer of the subjacent pleura. The upper ten ribs are then cut through at their angles and loosened from the pleura, the lower two ribs and the abdominal costal margin being left to preserve the attachment of the diaphragm. At about this time the body is turned over and the dissection is continued from in front. In case the other dissectors are not ready to turn, study the *hypophysis.* 861

— 16 —

The ribs having already been detached from the spine, it is now possible, by cutting it at the xiphoid process, to remove the sternum with the first seven pairs of ribs attached to it. By leaving the lower ribs we preserve the attachment of the diaphragm. At the same time we have exposed the whole mediastinal region and can at will replace the sternum and ribs to demonstrate its relations to the outlines of the heart, great vessels and lungs. In raising the sternum be careful to preserve the *internal mammary artery.* On under surface of sternum notice *transversus thoracis muscle* (triangularis sterni).

412 PLEURA. Examine structure and determine distribution and relation to thoracic viscera by exploring the pleural sacs. Notice particularly the margin along the anterior median line and the lower margin along the diaphragm. Compare with text book and atlas and determine their relation to ribs and sternum. Study demonstration model. Do the two pleural sacs open into each other? *Pulmonary ligament?* Function of pleura? In many bodies the pleura will be found thickened and adherent, owing to previous inflammation (pleurisy); in such cases the dissectors

should study the pleura on other tables. In cases where the pleural sac contains blood and exudate it should be thoroughly cleaned out with sponge.

Pleura: A. Visceral (pulmonary).
B. Parietal (1) costal;
(2) diaphragmatic;
(3) mediastinal.

— 17 —

ANTERIOR MEDIASTINUM. What is meant by mediastinum and what determines its subdivisions? Examine boundaries and contents of anterior mediastinum.

SUPERIOR MEDIASTINUM. Boundaries and contents? Examine *thymus gland; large vessels; phrenic, vagus* and *recurrent nerves.* Note their relations. *Ansa subclavia?*

Notice relation of pleura to pericardium. Strip pleura loose and open pericardium.

PERICARDIUM. Function and structure? Note fibrous and serous layers. Note difference between *parietal* pericardium and *visceral* pericardium. Determine exact relation of pericardium to heart and large vessels. *Transverse sinus? Oblique sinus?*

— 18 —

The remains of the thymus gland may now be removed and the superior mediastinum further dissected so as to expose the following structures:

68 1. Aorta and large vessels arising from it.
2. Superior vena cava and tributaries.
3. Ductus arteriosus.
4. Cardiac branches of vagus and sympathetic nerves.
5. Trachea.

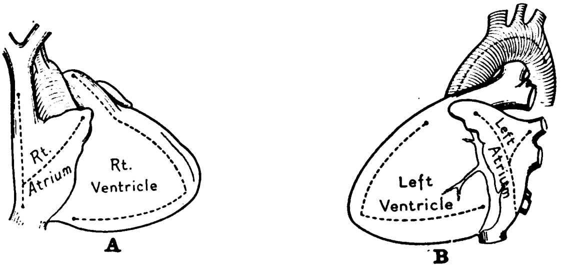
HEART. Examine different surfaces and note their relation to diaphragm and replaced sternum. Note relation of aorta to —621
Heart 614 sternum. Note *atria* (auricles), *auricular appendages, ventricles* and *sulci.* Study blood supply of heart wall. Remove pericardium and fat to expose the *right* and *left coronary arteries,* observe their origin and distribution. Identify the *great, middle, anterior* and *small cardiac veins. Coronary sinus,* its origin, position and termination?

72

### — 19 —

Open the heart in situ by making incisions with scissors or knife as indicated in the accompanying figure. The flaps outlined are raised and the blood clots and any injection matter are cleaned out, being careful not to tear the valves.

On some tables it is desirable to remove the heart unopened, together with the attached vessels, for the study of its surface anatomy.



The incisions indicated in this figure are planned so as to expose the whole interior of the heart without disturbing its connections or relations; and so that by replacing the flaps the outer form may be again restored. In A the heart is viewed from the right and in front; in B the posterior and inferior surfaces are shown, as seen when the apex is pulled upward and to the right.

Study the valves, orifices, and accessory structures in the different cardiac chambers, noting the mechanics of blood propulsion. *Foetal circulation?* Note the structure of the cardiac walls, and the difference in the musculature of the atria and ventricles.

### — 20 —

Examine the blood vessels connecting the heart and lung. Study their relation to the bronchi. *Bronchial arteries?* Notice relation of the vagus nerve to the root of the lung. The root of the lung is then divided and the lung removed.

LUNG. Study its relations, identifying surfaces and impressions due to contact with other structures. Note character of lobes and fissures. Study root of the lung, identifying the component structures and their relations. In soft specimens these structures may be dissected downward into substance of lung. Note *air-cells.* Note character of bronchial tree, comparing with illustrations in text books. *Pulmonary circulation?* Blood supply of lung tissue? After completing the study of the heart and lungs the dissector should carefully preserve the specimens and keep them moist for subsequent review.

### — 21 —

The parietal pleura should now be removed from posterior wall of thorax and an examination made of the following structures:

1. Sympathetic trunk:
    - (a) *rami communicantes,* connecting with intercostal nerves;
    - (b) *splanchnic nerves;*
    - (c) Communication with cervical sympathetic, *ansa subclavia.*
2. Vagus and recurrent nerves.
3. Thoracic duct (lymphatic vessels of thorax).
4. Azygos system of veins.
5. Arch of aorta and its branches.
6. Thoracic aorta and its branches.
7. Trachea and its relations.
8. Oesophagus and its relations.

The trachea and oesophagus should be followed well up in the neck, noting particularly their nerve and blood supply. Determine the distribution of the *inferior laryngeal nerve.* Trace the sympathetic ganglionated cord upwards into the neck, noting the middle and inferior cervical ganglia. Make a drawing of the azygos system of veins at natural size and with the bodies of the vertebrae indicated to denote the levels. These drawings are to be retained by the laboratory for statistical purposes.

### — 22 —

Having finished the study of these structures, the upper part of the body may be separated from the lower by cutting through the 6th thoracic intervertebral cartilage. In doing this the following structures are also divided: (1) inferior vena cava; (2)

thoracic duct; (3) aorta; (4) oesophagus; (5) vena azygos system; (6) vagus and sympathetic nerves. Note their relation to diaphragm and their manner of passing from abdomen to thorax and vice versa. Trace phrenic nerve into substance of diaphragm. The heart may either be left attached to large vessels or separated just above the semilunar valves.

After completing the thorax the dissector returns to the neck and head. The structures situated in the median line (larynx and constrictor muscles of pharynx) are to be dissected first, so that the head may be divided into bilateral halves as soon as possible. In order to properly dissect this region it must be separated with the front part of the head from the vertebral column, and a dissection made like those seen in Spalteholz Fig. 554 and in Sobotta Fig. 693.

This is done by separating with the fingers the oesophagus, etc., from the prevertebral muscles up to the base of the occipital bone, and then disarticulating the atlantooccipital joint, which separates the skull and dependent structures from the vertebral column. Study the *articulation of axis, atlas* and *occipital bones.* Study *longus colli* and *capitis* muscles. Ossification of occipito-atlantal joint?

## — 23 —

The interior of the skull is then examined and the twelve cranial nerves are identified, and their exit examined. Note particularly the glossopharyngeal, vagus, spinal accessory and hypoglossal nerves. Note also the *hypophysis* or pituitary body, its size, position and two lobes. Ductless gland?

A V-shape portion of the occipital bone is then sawn out by two oblique cuts, parallel with petrous portion of temporal bone, passing just behind the mastoid process and jugular foramen, and converging toward the basilar process. Afterward more of the basilar process is to be cut away with bone cutters to expose the upper end of the pharyngeal muscles, care being taken to preserve the sixth pair of cranial nerves. This produces a dissection like Sobotta's Fig. 693.

## — 24 —

Identify and determine relations of following structures:

Nerves—(1) hypoglossal;
(2) spinal accessory;
(3) vagus (ganglion nodosum);
(4) glossopharyngeus;
(5) cervical sympathetic and superior cervical ganglion.

Internal carotid artery. 115

Internal jugular vein.

Vagus Nerve. Study whole course of nerve. Make a list of all its branches and identify the more important ones. Their function?

## — 25 —

Pharyngeal Constrictor Muscles. Clean fascia from these muscles and determine their outlines and attachments. Action and nerve supply? Notice particularly the relation of the inferior constrictor to the larynx and oesophagus.

The constrictors may then be divided in the median line, exposing the interior of the pharynx.

Pharynx. (a) nasal; (b) oral; (c) laryngeal. Notice structure of wall of pharynx. Identify the following:

1. Velum palatinum (solt palate).
2. Uvula.
3. Pharyngeal recess (Rosenmueller).
4. Epiglottis.
5. Vallecula epiglottica.
6. Piriform recess.
7. Pharyngoepiglottic fold.
8. Aryepiglottic fold.
9. Fold of laryngeal nerve.
10. Interarytenoid incisure.

Notice transition into oesophagus. Oesophageal isthmus? Superior and inferior constrictions of oesophagus?

## — 26 —

LARYNX. Spread open superior laryngeal orifice and notice true and false vocal cords, rima glottidis, laryngeal ventricle (sinus) and interior of trachea. Dissect off mucus membrane from posterior or oesophageal surface of larynx and expose *superior* and *inferior laryngeal* nerves and accompanying arteries. Arteries are branches of what? Clean the *oblique* and *transverse arytenoid* and the *posterior cricoarytenoid* muscles. Determine origin, insertion and nerve supply of the *thyrohyoid*, and *cricothyroid muscles*. *Cricothyroid* and *thyrohyoid membranes?* The posterior two-thirds of one wing of the thyroid cartilage may be cut across and disarticulated to expose the *thyroarytenoid* and *thyroepiglottidean* muscles. The larynx is then split through the median line and its interior examined. Study character of vocal cord. Make a list of all intrinsic laryngeal muscles and their action and nerve supply. Study laryngeal cartilages and their articulations. Sensory nerve supply of larynx? Notice difference in size between male and female larynx.

## — 27 —

The entire head is then divided into right and left halves, using knife for soft structures.

### TOPOGRAPHY OF MEDIAN SECTION OF HEAD.

*Frontal sinus* and its connections.

*Nasal passage*: turbinate bones;
middle and inferior meatuses;
orifice of auditory tube (Eustachian);
torus tubarius;
salpingopharyngeal fold;
median septum of nose;
olfactory nerves.

*Nasopharynx*: pharyngeal recess;
ring of Waldeyer;
pharyngeal tonsil.

*Oral cavity*: hard and soft palates;
mucus membrane of tongue;
filiform, foliate and vallate papillae;
foramen caecum;
frenulum;
sublingual fold;
palatine tonsil;
glossopalatine arch (anterior pillar);
pharyngopalatine arch (posterior pillar).

5.2.

FACE. Reflect skin by an incision extending along lower and posterior border of mandible and continued from there upward in front of pinna of ear, where it joins the incision through scalp. The skin is now reflected toward the anterior median line. In reflecting skin use care not to injure *platysma, risorius* and *zygomatic muscles,* which are thin and lie directly under skin. It is well to commence in parotid region and finish cleaning it before the median part of face is uncovered.

— 28 —

1133 PAROTID GLAND. Notice character and attachments of *parotid fascia.* Find *parotid duct* (Stenson's). In dissection of facial nerve note structure, size and relations of the gland. What structures pass through gland? *Socia parotidis?* 1134

FACIAL NERVE. Cut away pieces of the parotid and expose the loops of the nerve (*pes anserinus*) and trace its branches forward to the muscles it supplies. Owing to parotid fascia it is sometimes difficult to recognize the branches. The best way is to first identify the zygomatic muscle, and then pick up the zygomatic branch which passes under its upper end. This can then be traced backward into substance of gland where it will lead to the other branches of the nerve. Complete the dissection of all branches, including those to frontalis and orbicularis oculi muscles. Note communications with trigeminal nerve.

— 29 —

Note arteries and veins of face. The veins may be cut away as soon as they are identified.

MUSCLES OF EXPRESSION. These are cleaned of fascia, and their origin and insertion studied. Those inserting in skin should be examined during the reflection of the latter, and in some cases a small piece of skin may be left in place (e. g. mentalis and frontalis).

Platysma (and Risorius).

Zygomaticus.

Quadratus labii superioris—three heads:
  (a) zygomatic (zygomaticus minor);
  (b) infraorbital (levator labii superioris);
  (c) angular (levat. lab. sup. alaeque nasi).

Triangularis (depressor anguli oris).

Orbicularis oris.

Nasalis—two portions:
  (a) transverse (compressor narium);
  (b) alar (depressor alae nasi).

Orbicularis oculi—three portions:
  (a) orbital;
  (b) palpebral;
  (c) lacrimal.

Corrugator.

Frontalis (and procerus).

Caninus (levator anguli oris).

Quadratus labii inferioris (depressor labii inferioris).

Mentalis.

Buccinator.

### — 30 —

The quadratus labii superioris should be divided to expose the *infraorbital nerve*, the branches of which are to be traced downward into upper lip. Likewise divide the triangularis and expose the *mental nerve* and *artery*. Find *buccinator nerve*. Does it supply buccinator muscle? Find external nasal branch of anterior ethmoidal.

The dissection should be continued up in the scalp. Note the *aponeurosis* and *frontalis* and *auricular muscles*. Trace *auriculotemporal, supraorbital, frontal* and *supratrochlear nerves*. The supraorbital nerve is best found by separating the fibres of the orbicularis over the supraorbital notch, which can usually be localized with finger, and picking up the nerve as it emerges from the bone. It can then be traced to its distribution by cutting furrows through frontalis muscle. Blood supply of scalp?

## — 31 —

The dissector now returns to the interior of the skull and reviews the cranial nerves and their exit and relation to dura. By carefully stripping up dura of the middle cerebral fossa, there is exposed the trigeminal nerve and the cavernous sinus. Avoid injury to third, fourth and sixth nerves.

TRIGEMINAL NERVE.

1. Root—(a) portio major (sensory);
   (b) portio minor (motor).
2. Semilunar ganglion (Gasserian). Structure and function?
3. Divisions—(a) opthalmic (superior orbital fissure);
   (b) maxillary (foramen rotundum);
   (c) mandibular (foramen ovale).

CAVERNOUS SINUS. On stripping off the dura the interior of the sinus is revealed by red stained walls due to the contained blood. Note structure of sinus and its contents; also its tributaries and termination.

Internal carotid artery.
3rd, 4th, 6th, and first division of 5th nerves.
Carotid sympathetic plexus.

## — 32 —

These structures are now traced forward into orbit.

ORBIT. Review bones forming walls of orbit. With chisel remove thin bony roof of orbit and lesser wing of sphenoid.

Reflect *orbital periosteum* and find *frontal nerve* and its branches, which should now be traced from the semilunar ganglion to its distribution in the scalp. Note lacrimal nerve. Notice *trochlear nerve* entering the upper margin of the superior oblique muscle. Divide frontal nerve and reflect ends. Clean *levator palpebrae superioris* and *rectus superior,* after which they are divided and ends reflected, noticing their nerve supply from underneath. With these structures divided the orbital fat can be removed safely, and without stretching nerves and muscles and thereby destroying relations. It is desirable in the case of the structures that pass through the superior orbital fissure that they should be dissected and carefully raised out of the fissure one at a time in their order from above downward. In dissecting the orbit one should have a well exposed field and not work in a pocket. To simplify dissection the veins and smaller arteries are removed as soon as they are identified. On account of its delicate roots and branches, it is well to identify the ciliary ganglion early:

CILIARY GANGLION.

Roots: (a) motor (inferior division oculomotor);
(b) sensory (nasociliary);
(c) sympathetic (carotid plexus).

Branches: Short ciliary nerves.

Notice origin of muscles from *common ring tendon* (ligament of Zinn). The superior oblique, levator palpebrae superioris and superior rectus are detached from the common ring tendon and turned back, together with their nerve of supply.

— 33 —

This exposes the *nasosciliary nerve,* as it passes through superior orbital fissure, the whole course and branches of which should now be examined. It should then be divided so that the optic nerve can be raised, so as to expose the *opthalmic artery.* After its branches are identified the ophthalmic artery should be removed. The lower division of the oculomotor is now exposed and its branches traced forward. Raise the oculomotor nerve and expose the *abducens nerve* and trace it throughout its whole course.

Notice sheath of optic nerve and fascia of bulb (Tenon's capsule). Function? Review nerve and blood supply of eyeball. Review origin, insertion, action and nerve supply of all muscles of orbit. Review all nerves of orbit and their branches.

Before removing eyeball and lacrimal gland the eyelids should be examined.

EYELIDS. Examine eye and eyelids in front and compare with living eye. Determine distribution of *conjunctiva?* Note character of *cornea, pupil* and *iris.* Note *semilunar fold* of conjunctiva, *lacrimal caruncle, lacrimal papilla, lacrimal pore* and *lacrimal pool. Superior* and *inferior fornix* of conjunctiva? Note attachment of eyelashes, and *Meibomian glands.*

Reflect orbicularis oculi toward median line and expose *tarsal plates.* Note insertion of levator palpebrae superioris. Note *orbital septum* and median palpebral ligament. Study cross section of eyelid showing layers from skin to conjunctiva. Twenty-four hours before dissection of the eyeball it should be injected with a hypodermic syringe with water until it is tense. Introduce the needle at the equator and obliquely to insure closure of the puncture.

— 34 —

LACRIMAL APPARATUS. Examine position, shape and structure of lacrimal gland. Remove gland together with adjacent conjunctiva and outer portion of upper tarsus and demonstrate *lacrimal ducts* connecting gland with conjunctiva. They appear as small thin-walled veins passing through the deep interlobular fascia of the gland. Study the course of the lacrimal secretion. Introduce fine probe in lacrimal pores and dissect out ducts leading to *lacrimal* sac. Nasolacrimal duct?

The conjunctiva may now be removed and tendons of external eye muscles examined, noticing their relation to bulbar fascia. Notice inferior oblique muscle. The eyeball may be removed.

EYE BALL. Bisect right eye through equator and left eye through sagittal plane, and study under water. Study structure of different coats. With finger remove vitreous body and study *fundus of eye.* Study structure and attachments of lens and iris. Structure and function of *ciliary body?* Examine choroid coat and identify *ciliary arteries* and *vorticose veins. Central artery* and *vein* of the retina? *Ora serrata?* Nerve supply of muscles in ciliary body and iris?

## — 35 —

MAXILLARY NERVE. The second division of the trigeminal nerve is best exposed from the median side. At the same time the character of the mucus membrane of the nasal passages, turbinate bones and the hard and soft palate is examined. Determine the area of distribution of the *olfactory mucus membrane*. By stripping off the mucus membrane and careful use of bone cutters the *sphenopalatine ganglion* is exposed and its branches traced out completely to their distribution: (a) *lateral nasal;* (b) *anterior, middle* and *posterior palatines;* (c) *nasopalatine*. Expose *sphenopalatine nerves* connecting ganglion with main trunk. Expose anterior end of nerve of pterygoid canal (*Vidian*).

The turbinate bones are now removed and the *maxillary sinus* (antrum) explored. Notice *nasolacrimal canal* and *frontal sinus.* The median wall of the orbit is then removed and the infraorbital nerve studied throughout its whole course. *Anterior, middle,* and *posterior superior alveolar nerves?*

## — 36 —

The third or mandibular division of trigeminal is best exposed from the outside, and in order to do this the ramus of the mandible and its attached muscles must now be dissected and removed.

MASSETER MUSCLE. Origin, insertion, structure and action? Separate it from its insertion on mandible from below upward, and find *masseteric nerve* supplying it from underneath near upper end, coming over the mandibular notch. After noting the attachment of temporal fascia to zygomatic arch, the latter is sawn through at each end and removed to expose the subjacent muscle. In removing the arch it is well to include the major part of the zygomatic bone.

TEMPORAL MUSCLE. Origin, insertion, structure and action? This muscle is removed by reflecting from below upwards, and the *deep temporal nerves* supplying it underneath are picked up as they cross the infratemporal crest. To do this the coronoid process of the mandible must be cut off and raised with muscle. A few of the anterior fibres of the muscle should be left in position, as the *buccinator nerve* lies in the fascia closely against the median surface of the tendon of insertion, otherwise the nerve is in danger of being removed with the temporal muscle.

After removal of temporal, complete the dissection of buccinator nerve and *buccinator muscle.* Nerve supply of latter?

INFRATEMPORAL REGION. To expose the pterygoid muscles a portion of the ramus of the mandible must be removed. Saw through the neck of the condyloid process to preserve articulation. Then pull out upper part of ramus, and stripping back periosteum watch for orifice of mandibular foramen with the entering *inferior alveolar nerve* and *artery.* The bone may be cut away from condyloid process to this point. Trace nerve backward towards origin identifying *mylohyoid* and *lingual* nerves, and later in the dissection the chorda tympani and auriculotemporal nerves. Trace inferior alveolar nerve distally in canal to where it ends in mental nerve. Note dental branches to roots of teeth. Study shape and structure of teeth, including nerve and blood supply. Manner of implantation?

## — 37 —

The *internal maxillary artery* in well injected specimens can be examined at this time. Dissect it back to its source and identify all its branches and their distribution. Note particularly the middle meningeal. Review all the branches of the *external carotid artery* and find those not yet seen. The internal maxillary may then be removed and the pterygoid muscles exposed. In some cases this artery has a deep course and cannot be exposed completely until after dissection of external pterygoid muscle.

Study character of *temporomandibular articulation.* Note articular disc. Disarticulate joint and determine origin, insertion and action of *external pterygoid muscle.* Carefully remove this muscle in fragments and expose the *internal pterygoid muscle* and the whole *mandibular nerve.* The bone forming the roof of the infratemporal fossa may be cut away nearly to the foramen ovale, which will allow the dissector to get well in and complete the study of the mandibular division, the *chorda tympani* and the *auriculotemporal nerve* with its characteristic forked origin. The *otic ganglion* lies directly median to the mandibular division as it emerges through the foramen ovale. It is best exposed by removing a section of bone from the temporal fossa, slightly anterior and lateral to the foramen ovale. Then with bone forceps carefully cut the bone away to the foramen. The semilunar ganglion and mandibular division of the nerve may now be carefully reflected outward thereby exposing the otic ganglion at the border of the foramen. It is sometimes partly inclosed in bony tissue.

## — 38 —

SUBMAXILLARY REGION. Examine origin, insertion, structure and action of *stylohyoid* and *digastric muscles.* Demonstrate their nerve supply. Review course of external maxillary artery and then remove it. Divide anterior belly of digastric at its origin on mandible and expose *mylohyoid muscle.* Determine its attachments and action, and then divide it along its attachment to mandible and reflect downwards. Clean *hypoglossal nerve* and trace as far forward as possible. Branches?

Trace *lingual nerve* into submaxillary gland and expose *submaxillary ganglion.* This region may be exposed also from above by removing buccinator muscle and dividing mucus membrane along the side of the tongue.

Study *submaxillary* and *sublingual glands* and their *ducts.*

Notice origin, insertion and nerve supply of the *hyoglossus muscle.* Notice its relation to *styloglossus muscle.* Divide hyoglossus along its attachment to hyoid bone and expose course of *lingual artery.* Notice carefully the relations of lingual artery and hypoglossal nerve to the mylohyoid and hyoglossus muscles.

## — 39 —

Complete muscles of tongue, noticing particularly the *geniohyoid* and *genioglossus muscles.*

Trace entire course of *glossopharyngeal nerve.* Trace it through constrictor muscle to mucus membrane at base of tongue. Constrictor muscles may be removed up to line of insertion of stylopharyngeus.

Identify muscles of *soft palate.* The *levator veli palatini* must be separated at its origin and reflected downward to expose the *tensor veli palatini.* Determine their action and nerve supply.

AUDITORY APPARATUS. Read the structure of the external, middle, and the internal ear. Also read the course of the *facial nerve,* the situation of the *geniculate ganglion* and *chorda tympani nerve.*

— 40 —

These structures are then exposed by cutting away fragments of bone with bone cutters or small chisel. Everything cannot be preserved in any one specimen, so it is desirable that several dissectors should work in cooperation, each making a different dissection. The following dissections are recommended:

1. Introduce probe in Eustachian tube and with it as a guide cut away the anterior wall of the tube, commencing at pharyngeal end and extending outward to anterior margin of tympanum. In doing this be careful to preserve the *tensor tympani muscle* and its tendon of insertion into handle of malleus. Note cartilagenous and bony portions of tube. The thin, bony roof of the epitympanic recess may also be removed, which exposes the communication of the tympanum with the mastoid cells. This dissection exposes especially well the ear ossicles and their articulation, as well as the drum membrane and fold caused by chorda tympani.

2. Trace the course of the facial nerve through internal auditory meatus, through facial canal, and out the stylomastoid foramen, noting its relations along the course. Note particularly its relation to the mastoid antrum.

3. With knife and bone cutters expose the external auditory meatus by removing its anterior wall. Notice attachment of pinna, the shape of the bony canal and the attachment of the tympanic membrane. The latter may be removed and the median wall of the tympanum examined. Note promontory formed by the bony cochlea bulging into tympanic cavity. A part of the Eustachian tube is also exposed.

4. Uncover roof of internal auditory meatus, and examine fundus with transverse crest and various foramina. Remove upper half of cochlea, which lies directly in front of its outer end. Remove the bony semicircular canals and expose the large vestibule out of which they open.

The student should examine as many specimens as possible, as certain structures will show much better in some specimens than in others.

Where possible it is desirable to decalcify the temporal bone in 10 per cent. nitric acid for several weeks, and this will facilitate the dissection. This can be done where students in a given section exchange their temporal bone specimens for those of a previous section which in the meantime have been in a decalcifying fluid.

*Make a list giving course and branches of all the cranial nerves.*

H. W. Porter

~~Fos~~dia, Kunst D W

Reed H R.

Berger P C

[illegible]

segments [illegible]

B. McKeon

Spleen
Pancreas.
Bile tract.
Relation of organ 1st Par in 28.
Portal V. Formation.

Diaphragm.
Lymphatic of Ab. & Pel. = Rec. chyli.
Lumbar Plexus.
Il. & Psoas., arrangement of st. under —
Poupart's Lig
Ext. genitalia M & F
Perineum — Boundary Fascia..

---

M & F
- isc Rectal fass.
- Perineum
- Trigone

---

Male genital tract & ass. Glands.
st. Penis
Urethra etc.

Relations of vagina - Relation to levator muscles
Pelvic genitalia -
Ureter Bladder - Urethra.
Course of ureter.
Hypogastric arty
Pelvic fascia as a whole
Sketch of frontal plane.